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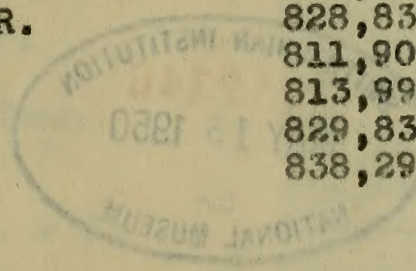
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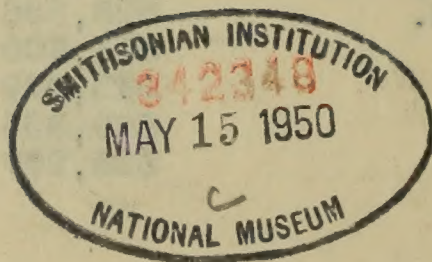
808,542 - 858,184

Jan. 2, 1906 - June 25, 1907

MAURO, CAMERON, LEWIS + MASSIE.

Aiken, E. L.	810,018. ✓
"	817,831. ✓
"	820,165. ✓
"	847,631. ✓
"	855,828. ✓
" & Durand	855,622. +
Apstein, D.	837,274. ✓
Aylsworth, J. W.	855,552. ✓
"	855,553. ✓
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"	855,605. ✓
"	855,606. ✓
Aylsworth & Dyer	855,604. ✓
Bauman, H. G.	842,059. ✓
Blake, L. I.	852,646. ✓
"	852,647. ✓
"	852,648. ✓
"	852,649. ✓
"	852,760. ✓
Brenner & Steiner	840,967. +
Brocherioux, et al.	842,070. ✓
Brocius, H. R.	828,836. ✓
Brown, J. T.	811,900. ✓
"	813,999. ✓
Breen, C. R.	829,836. ✓
"	838,297. ✓
Capps, F. L.	836,089. ✓
Cheney, G. K.	854,801. ✓
Chisholm, C. L.	814,941. ✓
Cole, A. W.	829,195. ✓
Cennolly, T.A. & J.B.	851,634. ✓
Cornwall, C.A.	839,920. ✓
Crabb, E. L.	828,598. ✓
Cruso, J. V.	829,848. ✓





Dennison, W. N.	832,896.
Desgrandchamps, E.	824,710.
Devineau, L.	856,038.
Dodd, D. A.	827,295.
Douglass, L. F.	831,546.
Dubinski, B.	817,756.
Durand & Aiken	855,622.
Dyer & Aylsworth	855,604.

Edison, T. A.	831,606.
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"	855,562.
2 - Bells, A. F.	837,551.
"	848,092.
Eifel, Jos.	821,629.
Elfering, J. H.	855,761.
Emerson, V. H.	831,779.
"	838,968.
English, J. C.	828,602.
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Fernan, W. S.	829,066.
Fischer, Alex	825,119.
Forsell, F. E.	832,249.
Fortier et al.	842,070.

Gardy, L.	828,309.
Gates, W. H.	825,045.
Gaven & Hoyt	808,842.
"	808,843.
"	809,263.
Gaynor, Jos.	816,908.
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Godwin & Hoffman	819,058.
Goldsmith, B. B.	840,932.
Gray, J. L.	814,839.
Greevy, M. J. & J.	820,642.
Grover, Z. T.	811,633.

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Hammer, J. T.	836,032.
Harris, V. M.	837,061.
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"	854,886.
"	854,887.

Hart, Wm.	817,062. ✓
Haug, Andrew	838,326. ✓
Head, Robt.	820,926. ✓
Hensch, G.	825,725. ✓
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Hoffman & Godwin	819,058. ✓
Helm, C. L.	858,184. ✓
Horton, W. G.	856,873. ✓
Houser, J. O.	811,295. ✓
Hoyt & Gaven	808,842. ✓
"	808,843. ✓
"	809,263. ✓
"	810,652. ✓
" Wm. H.	828,604. ✓
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Johnson, E. R.	814,786. ✓
"	814,848. ✓
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"	856,704. ✓
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Joyce, M.	831,668. ✓
Kelley, L. D.	845,645. ✓
Kitsee, I.	833,689. ✓
" "	836,510. ✓
Klein, Rudolph	814,053. ✓
Kline, David	858,077. ✓
Koch, Henry	849,404. ✓
Kraemer & Sheble	852,725. ✓
Kraus, O.	850,375. ✓
Lebiedzinski, P.	825,738. ✓
Leschbrandt, B.	821,045. ✓
Litts, W. J.	841,795. ✓
Lochmann, F. & W.	824,368. ✓
Macdonald, T. H.	830,446. ✓
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Maitre, A.	825,065. ✓
Manwaring, G. A.	811,568. ✓
"	819,072. ✓
Marotte, et al.	842,070. +
Maurer, A.	845,007. ✓

Milans, J. H.	832,403· ✓
Miller, C. M.	855,116· ✓
Mills, H. S.	812,512· ✓
Mobley, E. H.	834,629· ✓
" "	855,326· ✓
Morrissey, T. F.	831,455· ✓
Munson, M. L.	813,814· ✓

Nehr, W. F.	834,485· ✓
"	850,957· ✓
Noyes, C. W.	836,940· ✓

Otzen, C.	849,852· ✓
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Palmer, E. T.	851,311· ✓
Pancoast, E. A.	816,995· ✓
Parsons, C. A.	814,561· ✓
"	817,868· ✓
Paxton & Shigley	822,485· ✓
Pederson, P. O.	819,670· ✓
Petmecky, F.	849,425· ✓
Pierman, A. N.	829,123· ✓
"	847,687· ✓
Place, H. A.	831,987· ✓
Possens, M. A.	818,975· ✓
"	857,483· ✓
Prescott, J. O.	847,820· ✓
Pritchard, C. A. G.	818,119· ✓
Putt, H. O.	852,615· ✓

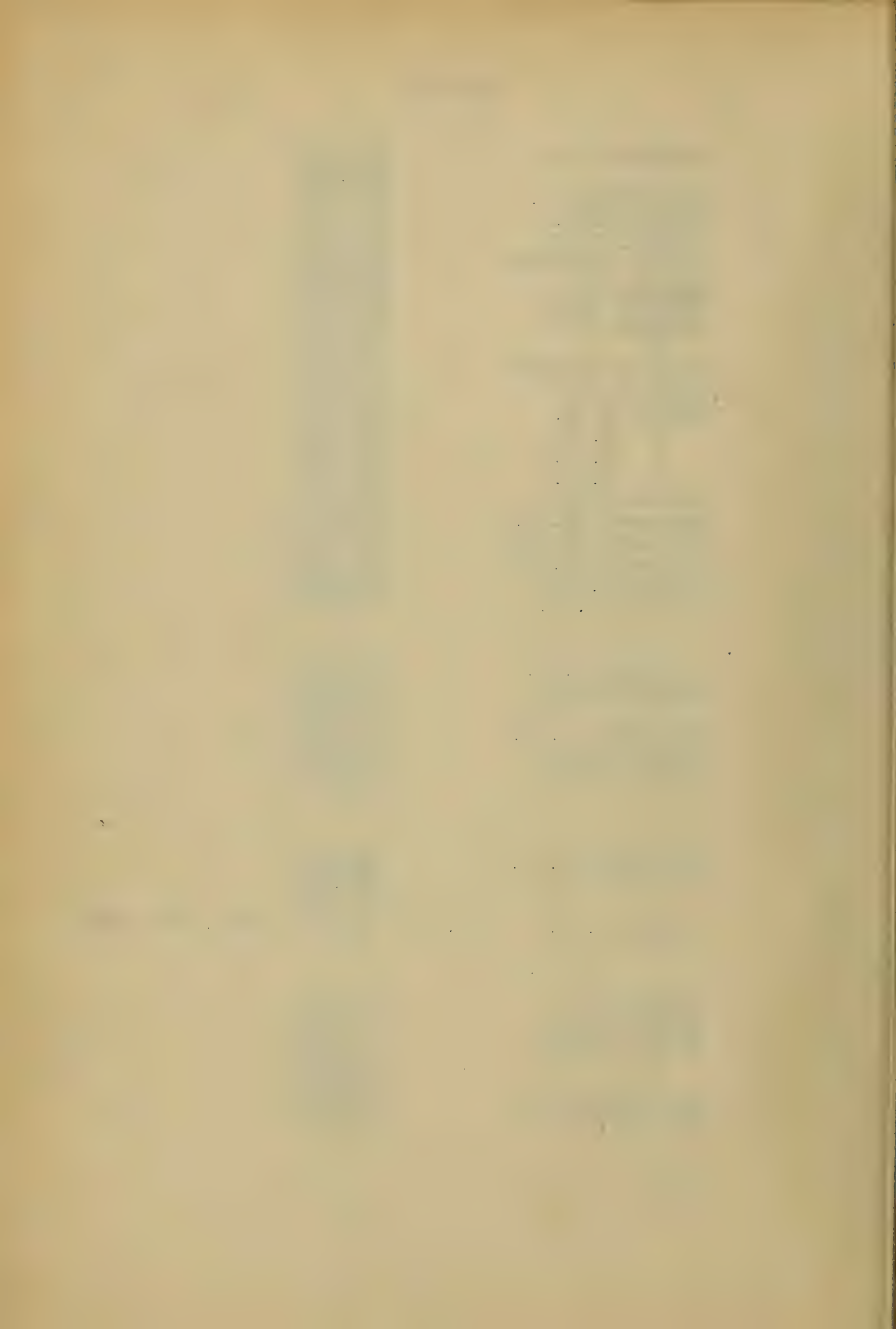
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Robinson, E. M.	813,670· ✓
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Rosenfield, W. W.	831,630· ✓
"	831,895· ✓
"	849,086· ✓
Rose, O. G.	842,707· ✓
Ryder, A. H.	840,089· ✓
Runge, E.	831,995· ✓
" W. C.	850,256· ✓

Sanders, Jos.	834,326. ✓
"	850,494. ✓
Schleicher, J. C.	837,585. ✓
Senne, C. A.	811,877. ✓
Shanks, F. F.	822,024. ✓
Sheble & Kraemer	852,725. ✓
Sheble, H.	855,674. ✓
Sheble, H.	843,042. ✓
Sheppy, Fred.	816,608. ✓
Shigley, C. C.	841,727. ✓
"	822,485. ✓
Shigley & Paxton	842,028. ✓
* Shue, E. F.	831,900. ✓
Smith, C. A.	836,470. ✓
" E. C.	857,209. ✓
" W. C.	857,765. ✓
" R. J.	832,703. ✓
Sollers, E.	839,902. ✓
Spurgeon, W. C.	840,967. ✓
Steiner & Brenner	856,553. ✓
Stilwell, W. L.	854,120. ✓
* Stone, J. S.	854,002. ✓
* Skelly, T. V.	

Terhune, L. L.	814,891. ✓
Thomas, Chas.	842,982. ✓
" "	842,983. ✓
Thompson, A. S.	840,526. ✓
Techon et al.	842,070. ✓
Tyler, W. S.	836,417. ✓

Valiquet, L. P.	830,689. ✓
"	840,974. ✓
"	855,736. ✓
Villy, G. H.	Re. --- 12,442 (Jan. 30, 1906) ✓

Wawrina, E.	847,033. ✓
Weber, Peter	811,010. ✓
" "	820,158. ✓
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Weislowits, E.	835,338. ✓
* - Wheeler, L. R.	844,838. ✓

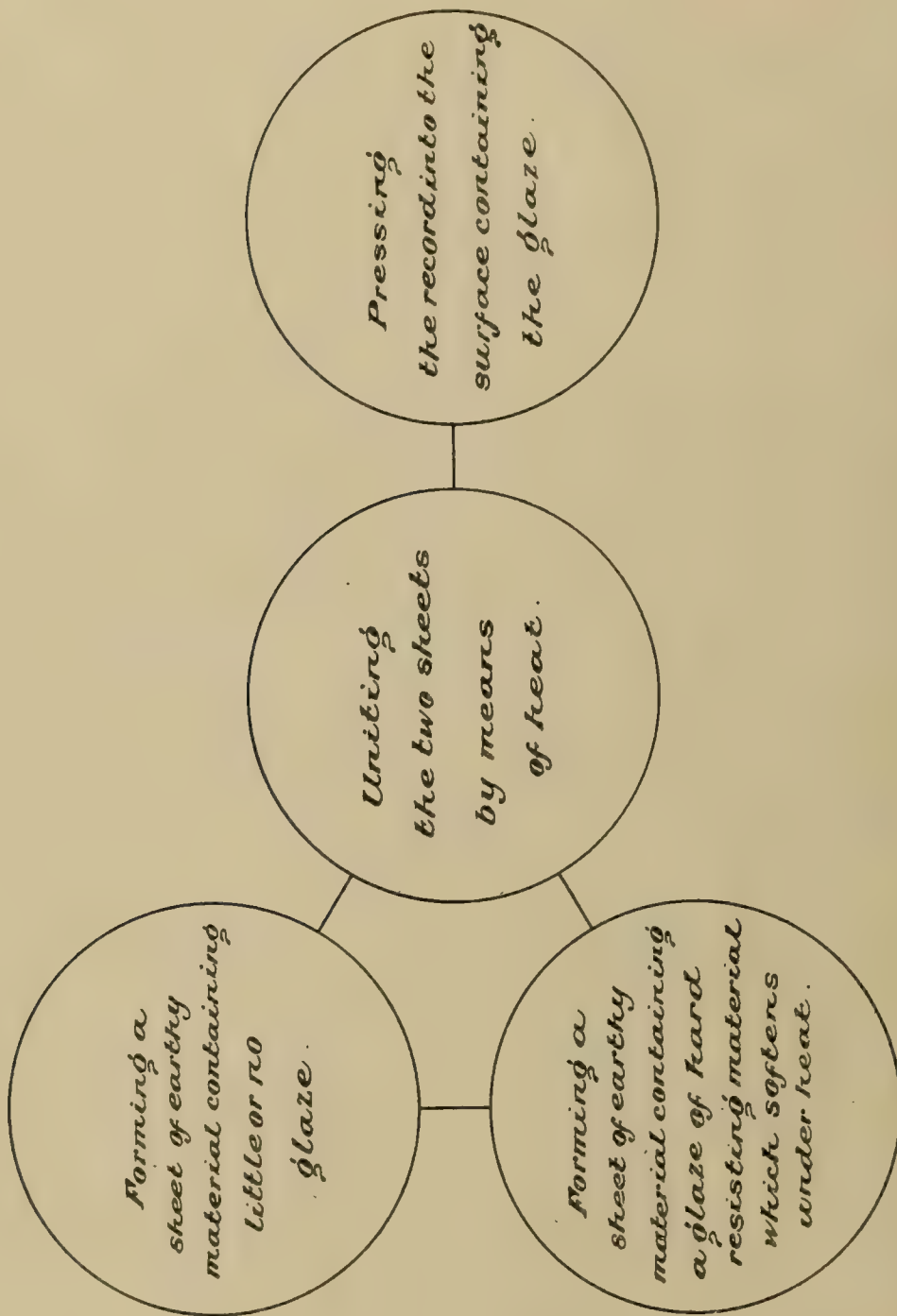


No. 808,842.

PATENTED JAN. 2, 1906.

W. H. HOYT & W. J. GAVEN.
MANUFACTURE OF SOUND RECORDS.

APPLICATION FILED JUNE 11, 1904.



Inventor

Witnesses

Wm. B. Berkham
Gustave R. Thompson

William H. Hoyt & William J. Gaven

By

Mauro, Cameron, Lewis & Massie

Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM H. HOYT AND WILLIAM J. GAVEN, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE BURT COMPANY, OF HACKENSACK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MANUFACTURE OF SOUND-RECORDS.

No. 808,842.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed June 11, 1904. Serial No. 212,216.

To all whom it may concern:

Be it known that we, WILLIAM H. HOYT and WILLIAM J. GAVEN, of Bridgeport, county of Fairfield, State of Connecticut, have invented a new and useful Improvement in the Manufacture of Sound-Records, which is fully set forth in the following specification.

This invention has reference to the production of pressed or molded sound-records—that is to say, of sound-records which are made by impressing the undulations corresponding to sound-waves upon a suitable tablet in the form of a disk, cylinder, or other suitable form.

Heretofore pressed or molded records have generally been formed upon tablets of homogeneous material, having the same coefficient of expansion and contraction throughout their mass. For this purpose various materials or compositions have been used with commercially satisfactory results. For making cylindrical records compositions of a wax-like character have been most commonly used. For making disk records compositions of earthy material compacted under pressure by means of a suitable binder, such as shellac, have been commonly used. These articles must have a mass or thickness sufficient to give them the strength required to withstand the incidents of handling and transportation, and in order to reduce the cost it has been proposed to make the body of the tablet of a relatively cheap substance (such as pasteboard or papier-mâché) and to spread thereupon a surface of the sound-recording composition. In such cases, however, the inconveniences arising from tablets composed of two substances differing in respect of their coefficient of expansion have prevented the lasting or successful use thereof. Records have also been made of a very thin shell of celluloid, xylonite, and like materials backed up by a thicker shell of pasteboard or the like without causing the adjacent surfaces of the two materials to adhere, so that each can expand and contract at its own natural rate.

The present invention has for its object to reduce the cost of the production of sound-records without any injurious effect upon the quality of the surface and without sacrifice of the strength of the tablet and without

incurring the objections which exist in composite tablets.

The invention is applicable to compositions which are for all practical purposes homogeneous throughout, but which contain an ingredient whose presence is necessary to give to the surface the hard glazed finish and other qualities absolutely indispensable for proper sound reproduction. For example, in the compositions of earthy material now commonly employed in the production of disk records an ingredient such as shellac is necessary to give the proper finish to the surface. This ingredient serves also as a binder and in making these compositions (whether for sound-records or other purposes) has always been distributed uniformly throughout the mass. This ingredient will be herein termed the “glaze.” Specifically we have discovered that a pressed sound-record formed of earthy material and containing the glaze only on the surface—that is to say, in a relatively small part of the entire thickness of the tablet—the body of the tablet being formed of a similar composition containing an ordinary binder has not only all the acoustical qualities of the sound-records as now made, but practically the same strength and resistance to shock and the same coefficient of expansion and contraction throughout its mass. Inasmuch as the glaze is the expensive ingredient in the composition, the invention materially diminishes the cost of production of these articles.

The invention may be applied in various ways. Practically we have found the following process to give good results, and it constitutes the best way in which we have contemplated applying the principle of the said invention. We form two batches of the plastic composition. One of these contains the usual ingredients mixed with an ordinary binder, such as Manila gum. The other contains the same (or like) ingredients with shellac instead of Manila gum. The two batches are rolled into sheets, that which is to form the surface of the tablet being quite thin relatively to the thickness of the sheet which is to form the body of the tablet. These two sheets when heated unite strongly together. The combined sheet is used as in the ordinary process of pressing records, the side containing the glaze being applied to the

matrix. The pressure impresses the sound-record upon the tablet and compacts the whole into what is practically a homogeneous tablet. A great many plastic compositions of the kind referred to herein are in common use, and the preparation thereof is well understood. Such composition may be formed of terra alba ten parts, barytes ten parts, and flock four parts, (by weight,) with Manila gum for the ordinary stock and shellac for the surface stock. A suitable pigment may be added.

The process is graphically illustrated in the accompanying diagram.

The novel sound-record tablet herein disclosed is not claimed in the present application, since such sound-record tablet forms the subject of our application, Serial No. 265,325, filed June 15, 1905, which is a division of the present application.

Having now fully described our invention, what we claim is—

1. The process of making pressed sound-

records which consists in forming a sheet or tablet of a layer of earth material containing a glaze of hard resisting material which softens under heat, and a layer of similar material containing little or no glaze, heating the two layers together, and pressing the record in the face containing the glaze.

2. The process of making pressed sound-records which consists in forming a sheet of earthy material containing shellac, and another sheet of like material containing little or no shellac, uniting the two layers by means of heat, and pressing the record into the surface containing the shellac.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM H. HOYT.
WILLIAM J. GAVEN.

Witnesses:

PHILIP MAURO,
W. R. MILLER.

No. 808,843.

PATENTED JAN. 2, 1906.

W. H. HOYT & W. J. GAVEN.
METHOD OF MANUFACTURING SOUND RECORDS.
APPLICATION FILED DEC. 8, 1904.

Powdered Glaze.



Plastic Mass.

Witnesses

Gustave R. Thompson.
Frederick A. Holton.

Inventors

William H. Hoyt and
William J. Gaven.

By

Morris, Cameron, Lewis & Massie

Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM HELM HOYT AND WILLIAM JOSEPH GAVEN, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE BURT COMPANY, OF HACKENSACK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF MANUFACTURING SOUND-RECORDS.

No. 808,843.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed December 8, 1904. Serial No. 236,074.

To all whom it may concern:

Be it known that we, WILLIAM HELM HOYT and WILLIAM JOSEPH GAVEN, of Bridgeport, Connecticut, have invented a new and useful Improvement in Methods of Manufacturing Sound-Records, which invention is fully set forth in the following specification.

The present invention relates to an improvement upon the process described in our application for patent, Serial No. 212,216, filed June 11, 1904, which describes the production of pressed sound-records having the "glaze" (shellec, for example,) practically confined to the surface part of the record. In carrying out the invention as therein described we formed two batches of the plastic material, one containing the usual proportion of shellac, the other containing no (or a very slight quantity of) shellac. The two batches were rolled into sheets, that containing the shellac being about half the thickness of the other sheet. The two sheets were placed one upon the other and united by heat and pressure, which could be applied simultaneously with the impression of the sound-record upon the surface. In carrying out the process in that way we found that the surface sheet would not invariably flow so as to cover the tablet continuously, and the result would be an occasional record having soft spots which would quickly wear away. Furthermore, it was not easy to use always the same amount of the surface stock, thus incurring either the risk of using too little or the waste of using more than necessary. By the present invention we remedy these difficulties completely. Instead of applying the stock to form the face of the tablet in a plastic condition we apply it in a dry state in the form of a powder, whereby a continuous layer of practically uniform thickness can be obtained. Preferably we take the composition after being well ground and mixed, as usual, and apply it by means of a sieve or sifter to the surface of the matrix, so as to cover the face thereof completely, with a layer approximating one-third of the thickness of the finished record. On this is placed the stock

which is to form the body part of the record, and hydraulic pressure is then applied, as usual.

The operation may be most conveniently carried out by means of a circular sieve or sifter of well-known construction having the same diameter as the matrix. Placing such a sifter above the matrix and giving a turn to the clearing device in the sifter causes the deposit on the matrix of a layer of the composition of the required thickness. This operation can be performed very expeditiously, and the results are entirely satisfactory. Preferably we use for this operation the sifter or sieve described in our application, Serial No. 239,936, filed January 6, 1905.

The accompanying drawing illustrates conventionally the tablet resulting from our method, the relative thickness of the layer of powdered glaze being slightly exaggerated.

Having now fully described our said invention, we claim—

1. The method of forming a sound-record tablet by applying upon the surface of the die or matrix a layer of plastic material in a dry and finely-divided state, and a layer of similar material in a plastic state, and uniting the two by heat and pressure.

2. The method of forming a sound-record tablet by applying pressure to two batches or layers of plastic material, one layer being in the form of a dry powder, the other in a plastic condition.

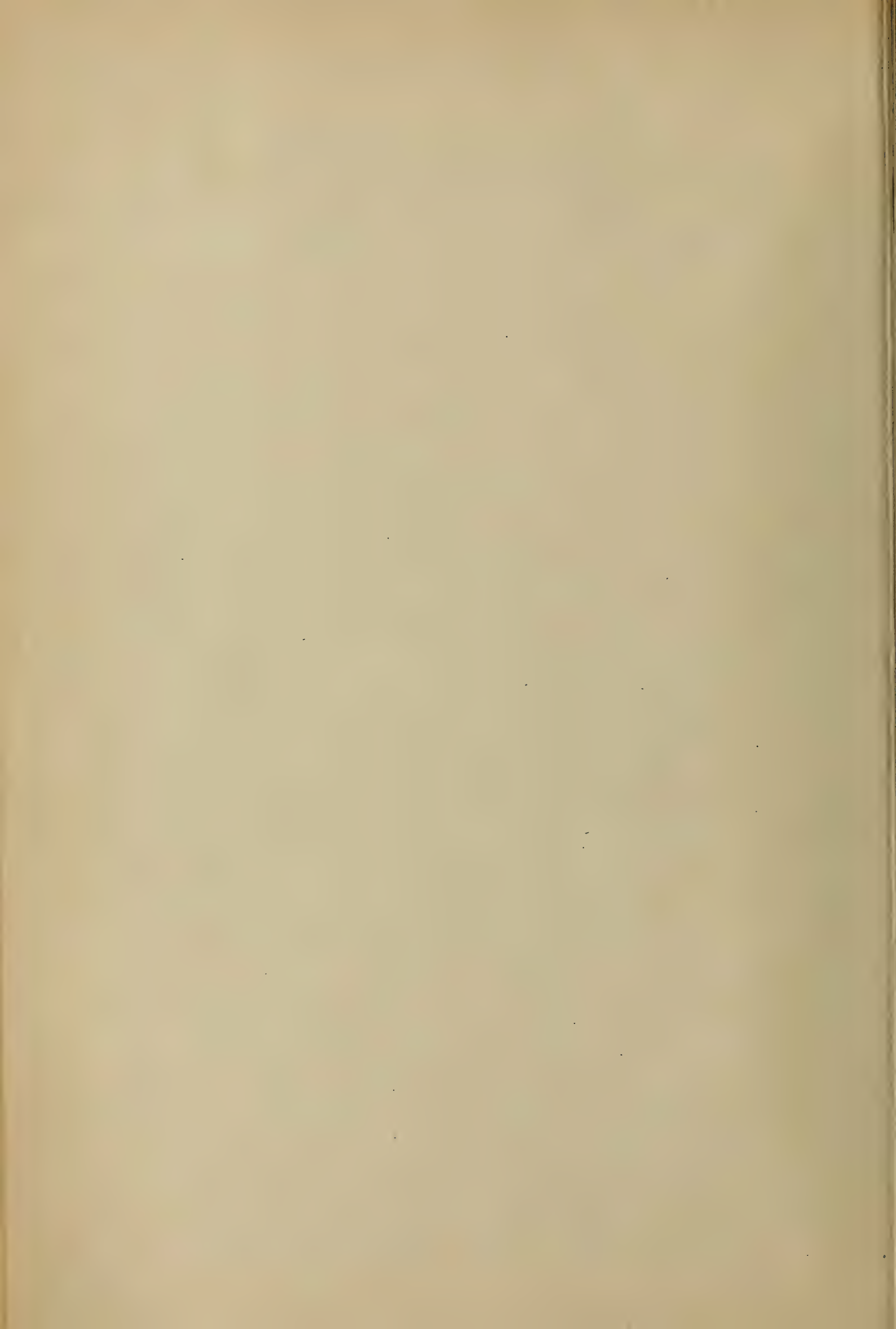
3. The method of forming a compressed sound-record by applying upon the surface of a suitable matrix or die a layer of finely-divided material containing a glaze, applying to said layer a batch of similar material essentially free from glaze, and uniting the two layers by means of heat and pressure.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM HELM HOYT.
WILLIAM JOSEPH GAVEN.

Witnesses:

JOHN FRANCIS McCORMICK,
THEO. E. NOOCKOSKI.



No. 809,263.

PATENTED JAN. 2, 1906.

W. H. HOYT & W. J. GAVEN.

SOUND RECORD TABLET.

APPLICATION FILED JUNE 15, 1905.



Inventors

Witnesses

Wm. B. Herkum

Gustave R. Thompson

William H. Hoyt & William J. Gaven,

By

Mauro, Cameron, Lewis & MacCie
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM HELM HOYT AND WILLIAM JOSEPH GAVEN, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE BURT COMPANY, OF HACKENSACK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD TABLET.

No. 809,263.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Original application filed June 11, 1904, Serial No. 212,216. Divided and this application filed June 15, 1905. Serial No. 265,325.

To all whom it may concern:

Be it known that we, WILLIAM HELM HOYT and WILLIAM JOSEPH GAVEN, of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-Record Tablets, which invention is fully set forth in the following specification.

This invention has reference to pressed or molded sound-records—that is to say, of sound-records which are made by impressing the undulations corresponding to sound-waves upon a suitable tablet in the form of a disk, cylinder, or other suitable form.

Heretofore pressed or molded records have generally been formed upon tablets of homogeneous material having the same coefficient of expansion and contraction throughout their mass. For this purpose various materials or compositions have been used with commercially satisfactory results. For making cylindrical records compositions of a wax-like character have been most commonly used. For making disk records compositions of earthy material compacted under pressure by means of a suitable binder, such as shellac, have been commonly used. These articles must have a mass or thickness sufficient to give them the strength required to withstand the incidents of handling and transportation, and in order to reduce the cost it has been proposed to make the body of the tablet of a relatively cheap substance (such as pasteboard or papier-mâché) and to spread thereupon a surface of the sound-recording composition. In such cases, however, the inconveniences arising from tablets composed of two substances differing in respect of their coefficient of expansion have prevented the lasting or successful use thereof. Records have also been made of a very thin shell of celluloid, xylonite, and like materials backed up by a thicker shell of pasteboard or the like without causing the adjacent surfaces of the two materials to adhere, so that each can expand and contract at its own natural rate.

The present invention has for its object to reduce the cost of the production of sound-records without any injurious effect upon the quality of the surface and without sacrifice of the strength of the tablet and without incurring the objections which exist in composite tablets.

The invention is applicable to compositions which are for all practical purposes homogeneous throughout, but which contain an ingredient whose presence is necessary to give to the surface the hard glazed finish and other qualities absolutely indispensable for proper sound-reproduction. For example, in the compositions of earthy material now commonly employed in the production of disk records an ingredient such as shellac is necessary to give the proper finish to the surface. This ingredient serves also as a binder and in making these compositions (whether for sound-records or other purposes) has always been distributed uniformly throughout the mass. This ingredient will be herein termed the "glaze."

Specifically, we have discovered that a pressed sound-record formed of earthy material and containing the glaze only on the surface—that is to say, in a relatively small part of the entire thickness of the tablet—the body of the tablet being formed of a similar composition containing an ordinary binder, has not only all the acoustical qualities of the sound-records as now made, but practically the same strength and resistance to shock and the same coefficient of expansion and contraction throughout its mass. Inasmuch as the glaze is the expensive ingredient in the composition, the invention materially diminishes the cost of production of these articles.

The invention may be applied in various ways. Practically we have found the following process to give good results, and it constitutes the best way in which we have contemplated applying the principle of the said invention: We form two batches of the plastic composition. One of these contains the usual ingredients mixed with an ordinary binder, such as Manila gum. The other contains the same (or like) ingredients, with shellac instead of Manila gum. The two batches are rolled into sheets, that which is to form the surface of the tablet being quite thin relatively to the thickness of the sheet which is to form the body of the tablet. These two sheets when heated unite strongly together. The combined sheet is used as in the ordinary process of pressing records, the side containing the glaze being applied to the matrix. The pressure impresses the sound-

record upon the tablet and compacts the whole into what is practically a homogeneous tablet. A great many plastic compositions of the kind referred to herein are in common use, and the preparation thereof is well understood. Such composition may be formed of terra alba, ten parts; barytes, ten parts, and flock, four parts, (by weight,) with Manila gum for the ordinary stock and shellac for the surface stock. A suitable pigment may be added.

For the purpose of illustration there is shown in the accompanying drawing a sectional view through a flat or disk type of sound-record such as heretofore described.

Referring to the drawing, 1 indicates the body of the tablet, formed of a suitable earthy material and containing any usual or suitable binder, such as Manila gum, and 2 indicates the surface of the tablet in which the record of sound is formed and which is composed largely of a suitable glaze, such as shellac, which, however, forms only a relatively small part of the entire thickness of the tablet. In the drawing the thickness of the skin in proportion to that of the body is exaggerated for clearness of illustration.

The novel process of making the sound-record herein disclosed is not claimed in the present application, since such process forms the subject of our application, Serial No.

212,216, filed June 11, 1904, of which the present application is a division.

What is claimed is—

1. A sound-record tablet whose body is composed mainly of earthy material and having a thin surface layer composed of like earthy materials with the addition of shellac,

2. A sound-record consisting of a tablet of suitable earthy materials containing little or no shellac but provided with a skin containing shellac and containing also resisting material similar to that of the body of the tablet, and having the sound-record in or upon said skin.

3. A sound-record consisting of a tablet having a uniform coefficient of expansion whose body is composed mainly of earthy materials containing little or no shellac and having a surface layer containing like earthy materials and shellac, said layers being united together and constituting a tablet, the sound-record groove being impressed upon said surface layer.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM HELM HOYT.

WILLIAM JOSEPH GAVEN.

Witnesses:

JOSEPH HENRY WHEELER.

HARRY G. BRISTOL.

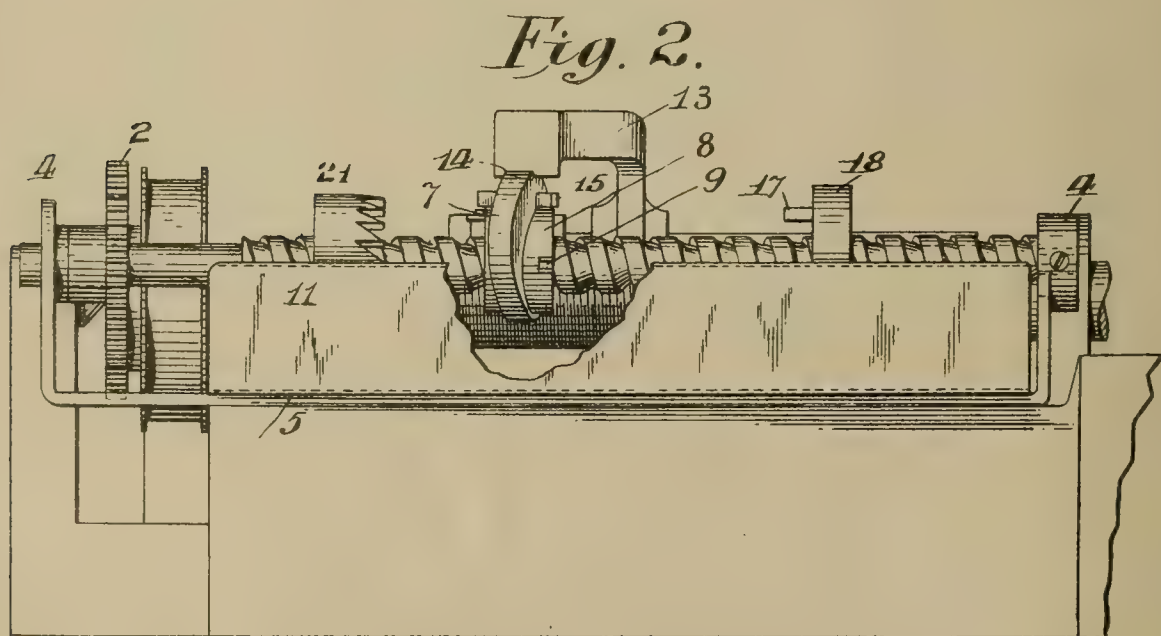
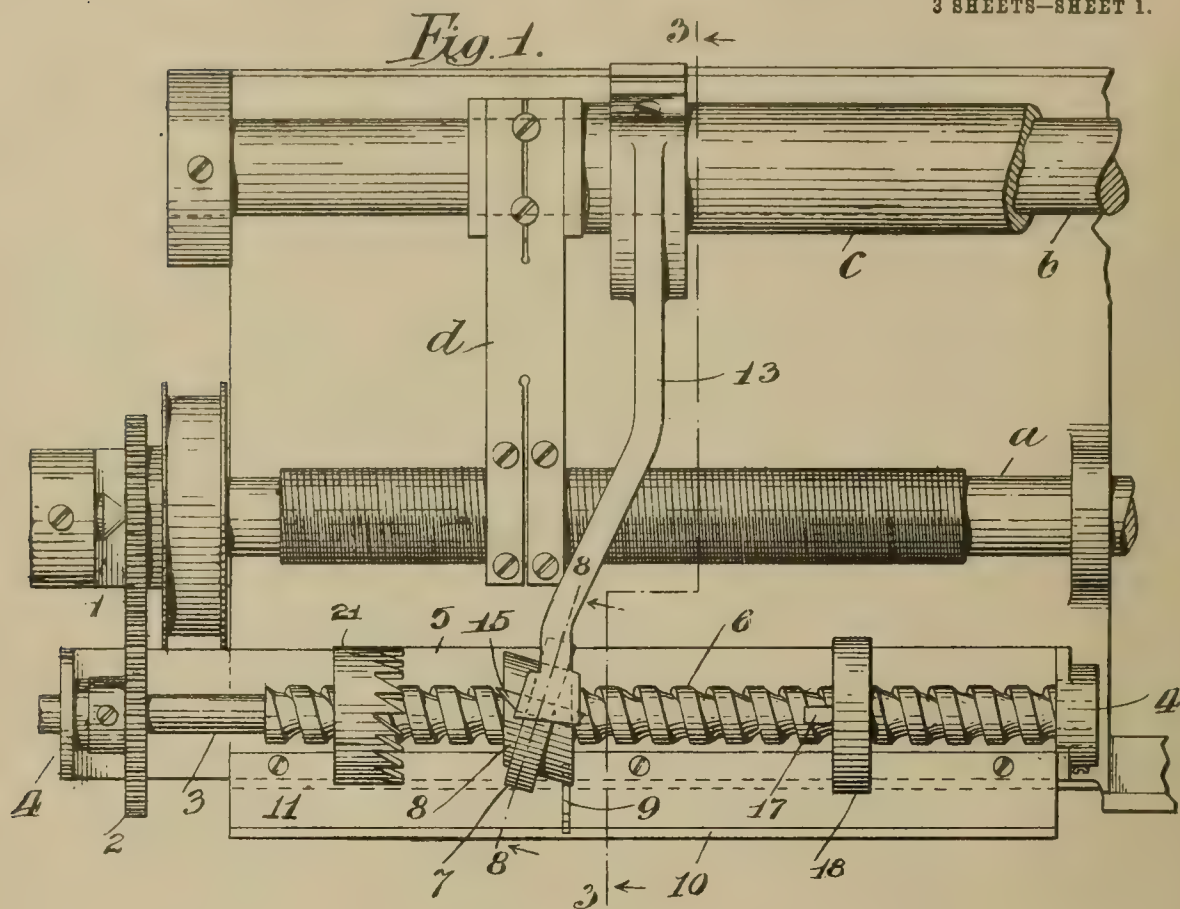
No. 810,018.

PATENTED JAN. 16, 1906.

E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 1.



Witnesses
W. J. McQuinn
Delos Holden

Inventor:
Edward L. Aiken
By his Attorney
Frank L. Riser

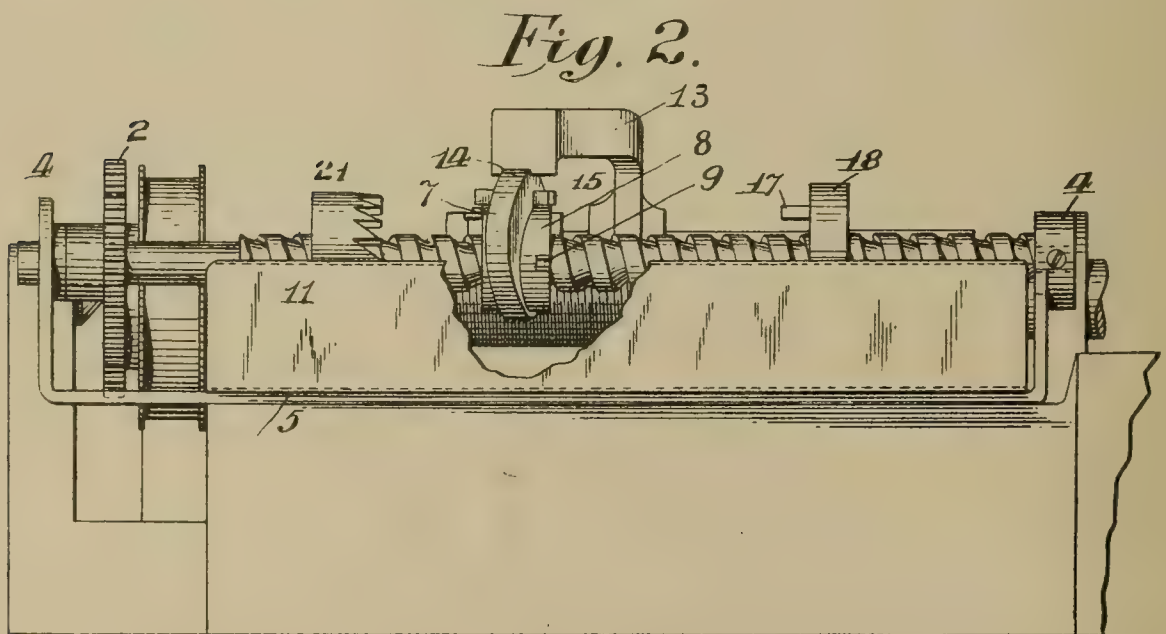
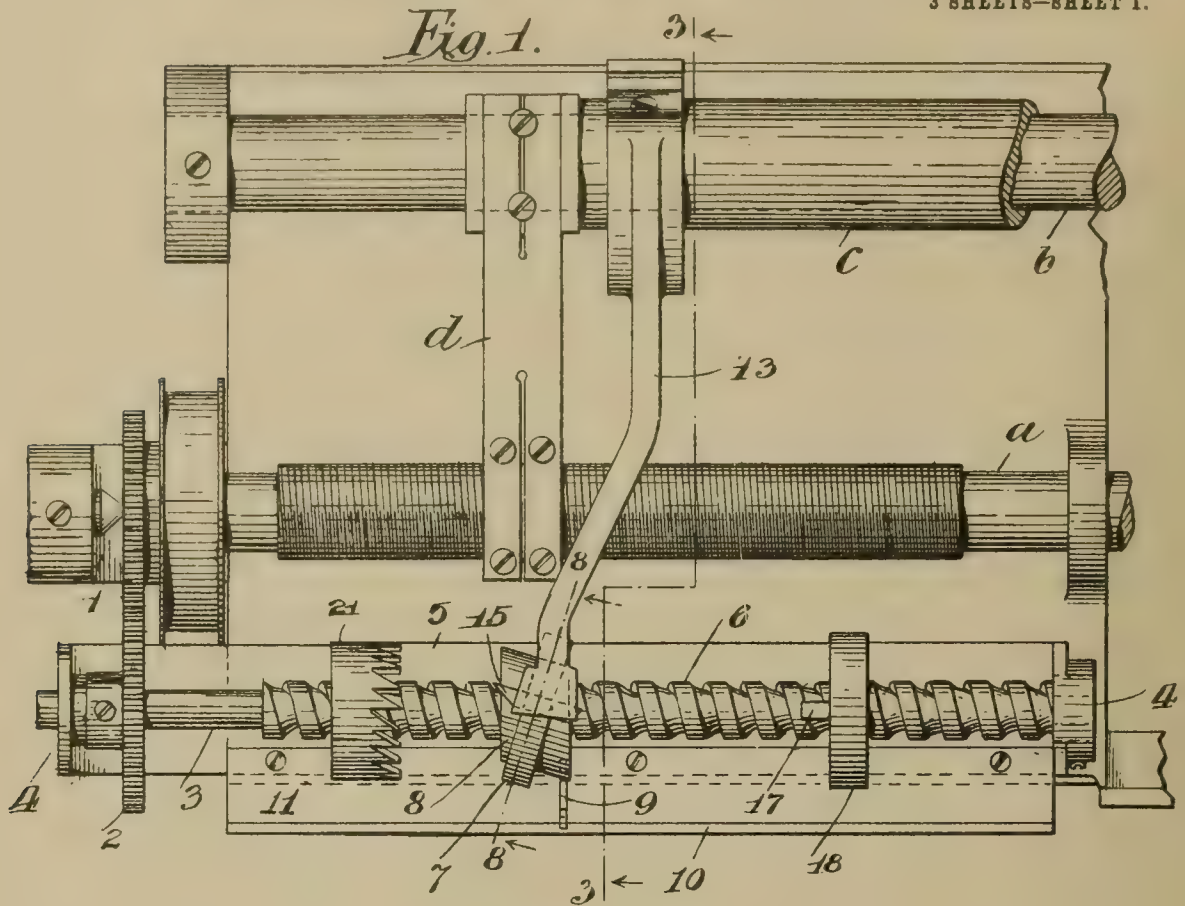
No. 810,018.

PATENTED JAN. 16, 1906.

E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 1.



Witnesses
W. J. McQuinn
Delos Holden

Inventor:
Edward L. Aiken
By his Attorney
Frank L. Brown

No. 810,018.

PATENTED JAN. 16, 1906.

E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 2.

Fig. 3.

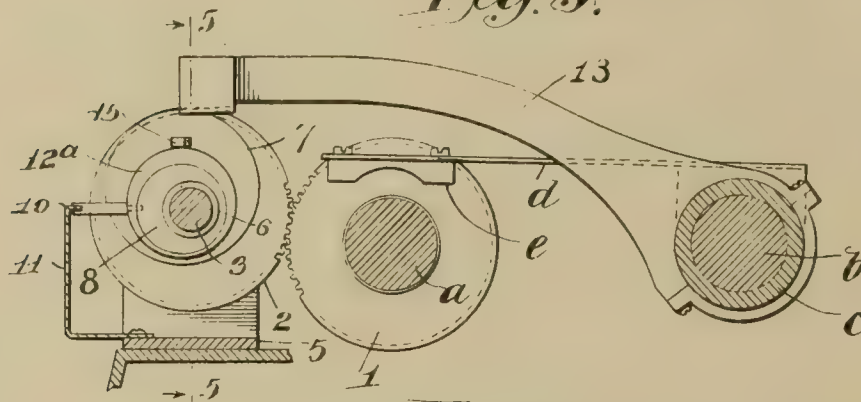


Fig. 4.

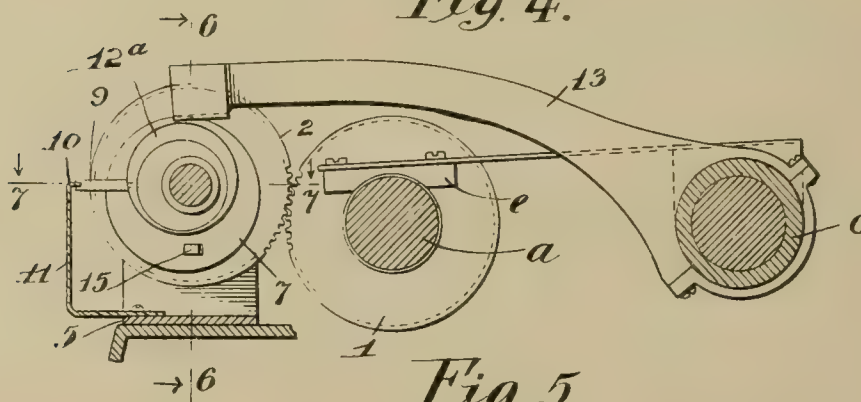


Fig. 5.

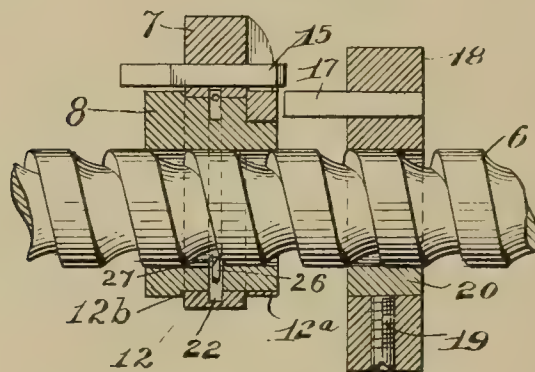
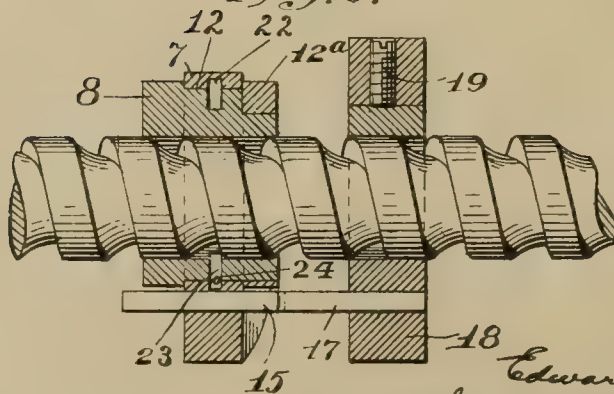


Fig. 6.



Witnesses
N. C. McFing
De los Holden

Inventor.
Edward L. Aiken
By his Attorney
Frank C. Gower

E. L. AIKEN.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 3.

Fig. 10.

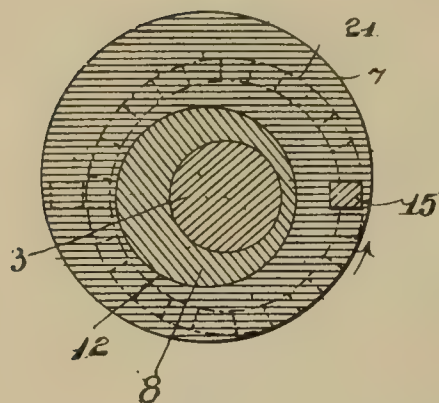


Fig. 12.

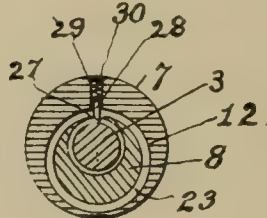


Fig. 14.

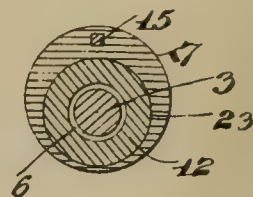


Fig. 13.

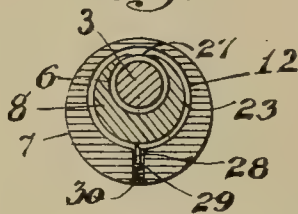


Fig. 15.

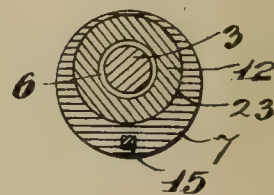


Fig. 11.

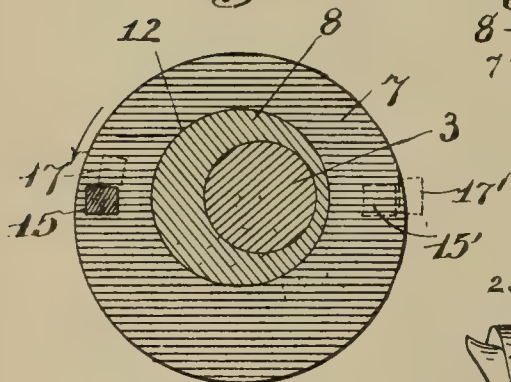


Fig. 7.

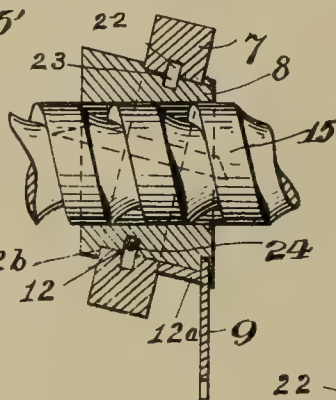


Fig. 8.

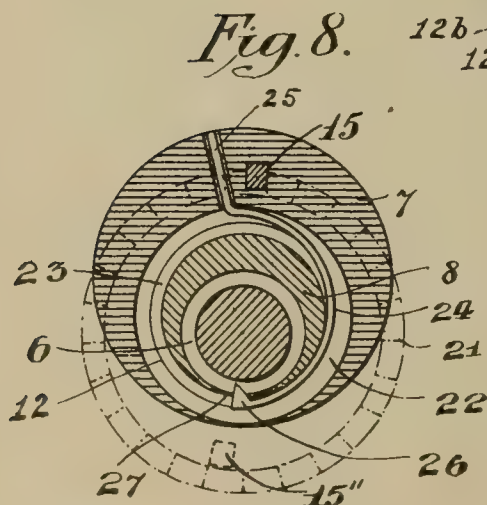
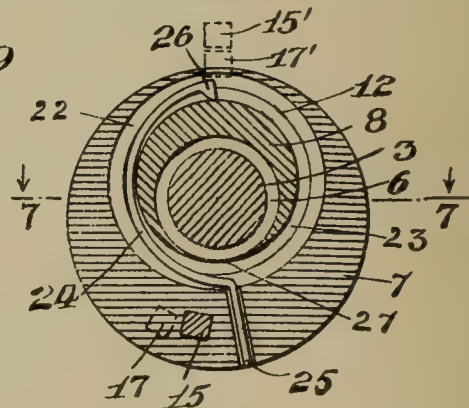


Fig. 9.



Attest:

W. J. McQuinn
Belos Holdea

Inventor:

Edward L. Aiken
by *Frank L. Aiken* Att'y.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

No. 810,018.

Specification of Letters Patent.

Patented Jan. 16, 1906.

Application filed June 24, 1905. Serial No. 266,883.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Repeating Attachments for Phonographs, of which the following is a description.

My invention relates to devices which are applied to phonographs and other talking-machines by means of which the sound-box may be automatically raised at any desired point of the record and returned to any other desired point, whereupon the sound-box is caused to descend into operative engagement with the record, so that the same selection can be played over and over again without any attention on the part of the operator.

Attachments of this general character are well known in the art.

My present invention has for its object the provision of such an attachment which will be simple in construction, cheap to manufacture, reliable in operation, and which will effect the elevation and depression of the sound-box without sudden or abrupt movements.

To this end my invention consists in the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawings, in which—

Figure 1 is a plan view showing my invention in its preferred form applied to a phonograph, of which only the adjacent parts are shown. Fig. 2 is a front elevation of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1 and shows the parts in the positions assumed during the return movement of the sound-box. Fig. 4 is a similar view showing the same parts in the positions assumed during the forward travel of the sound-box. Fig. 5 is a section on line 5 5 of Fig. 3. Fig. 6 is a section on line 6 6 of Fig. 4. Fig. 7 is a section on line 7 7 of Figs. 4 and 9. Fig. 8 is a section on line 8 8 of Fig. 1. Fig. 9 is a view similar to Fig. 8 and showing the parts in the positions which are assumed when the sound-box is in its lowered or operative position. Figs. 10 and 11 are diagrammatic views illustrating a modification. Figs. 12 and 13 are similar views of a second modification. Figs. 14 and 15 are similar views of a third modification.

In all the views corresponding parts are indicated by the same reference characters.

In Fig. 1 of the drawings, *a* is the main shaft of a phonograph formed with the usual feed-screw, *b* the back rod, *c* the sleeve, to which is secured the spring-arm *d*, which carries at its forward end the feed-nut *e*, which engages with the feed-screw during the forward movement of the sound-box carrier, all of which parts are well known and form no part of my invention.

Driven from the feed-screw shaft *a* by means of gears 1 and 2 is a return-screw shaft 3, journaled in bearings 4 4, carried by any suitable support 5, secured to the body of the phonograph. The shaft 3 is formed with a screw 6 of a coarse pitch, whereby the sound-box will be rapidly returned to its initial position.

The device for effecting the elevation of the sound-box is capable of numerous modifications; but all forms of the invention which are illustrated make use of the following instrumentalities. A cam or disk 7 is mounted on the return-screw, preferably on a sleeve 8, which is held against rotation by an arm 9, projecting forwardly therefrom and having a notch at its forward end for engagement with a guide 10, formed integral with the plate 11, secured to the base 5. This sleeve is formed with a bearing 12, the axis of which is inclined with respect to the axis of the shaft 3, and the cam 7 is rotatable on said bearing, being held between the shoulder 12^b and the ring 12^a, secured to the sleeve 8. The sleeve *c* of the sound-box carriage is provided with a forwardly-extending arm 13, whose forward end is notched, as shown at 14, to receive the upper portion of the cam 7. The cam 7 is fed along longitudinally of the return-screw by the sound-box carriage during its forward or operative movement, remaining during this time in a fixed position as regards rotation. Means are provided for giving the cam a half-turn at the end of its forward travel to effect the raising of the sound-box carrier, the disengagement of the feed-nut from the feed-screw, and the engagement of suitable means with the return-screw. The cam then supports the carriage and returns it to its initial position, remaining during this time without rotation. Additional means are provided at the end of the rearward travel of the cam

for giving it a half-turn to restore the parts to their original positions. The cam 7 is provided with a pin or projection 15, passing through the same and projecting from both
 5 faces thereof. The object of this pin is to engage a rotating pin, tooth, or projection at each end of its travel, so that the cam may be given a half-turn, at the end of which time the projections pass out of engagement with
 10 each other. The rotating projection which engages the pin 15 at the end of its forward travel may be a pin 17, carried by a disk 18, which disk is fixed to the screw 6, being adjustable longitudinally thereof and held in
 15 any desired position by means of a set-screw 19, which bears against a block 20, of soft metal, and presses the same against the surface of the screw, Fig. 5. The rotating member for engaging the pin 15 at the end of its
 20 rearward travel may be a toothed or notched wheel 21, adjustable along the screw 6 and held in any suitable position by any appropriate means, such as those shown in connection with the disk 18. If desired, a disk carrying a single pin may be substituted for the
 25 wheel 21; but in such case care must be taken that the pin be so situated with respect to the thread of the screw 6 that the pin will be in proper position for striking the pin 15 immediately upon the return of the cam 7. The
 30 pitch of the return-screw is so great as to carry the parts along about a quarter of an inch every revolution, and if the projection rotating with the screw should not be in the proper location to engage the pin 15 as soon
 35 as it reaches the plane of rotation the face of the cam will be carried against the end of the projection and the mechanism will be inoperative. In order to provide against such an
 40 occurrence, it is desirable to use a disk carrying several pins, or preferably the wheel shown, which has twenty-five teeth, so that each tooth corresponds to one one-hundredth of an inch rearward travel of the cam 7, which
 45 is the relation existing between the pin 17 and the cam in its forward travel.

The features so far described are common to all the forms shown. The various forms illustrated differ in the arrangements of cam
 50 7 and pin 15 and bearing 12, which I will now refer to.

It is obvious that on account of the inclination of the axis of the cam 7 its rotation will cause the pin 15 to travel both longitudinally
 55 and transversely with respect to the axis of the return-shaft 3. During one hundred and eighty degrees of rotation the pin will move toward the right, Figs. 1 and 2, and for the remaining one hundred and eighty degrees it
 60 will move toward the left. The pin 15 is so placed that during the forward travel of the cam the pin is in its medial position as regards longitudinal movement. As soon as the pin 15 comes in contact with the pin 17 it

will be moved thereby, and the extent of 65 overlap of the two pins will on account of the inclination of the cam 7 increase for a quarter of a turn and will then decrease until the pins entirely separate, which will be as many
 70 degrees as the overlap increases, and when the path of the pin 15 is concentric to the shaft 3, as in Figs. 14 and 15, there will be required a slight additional turning, due to the amount of initial overlap which the pins had
 75 when they came into contact and which may be anything less than the pitch of the feed-screw, usually one one-hundredth of an inch. If the pin 15 during the lifting operation is carried beyond its medial position, it may
 80 during the lowering operation contact with the tooth of the wheel 21 for less than one hundred and eighty degrees. Then the pin 15 on its next forward trip may be engaged by the pin 17 sooner than before and may
 85 on this account be carried around farther than before, thus introducing an irregularity as to the positions at which the pin 15 is engaged and disengaged by the pin 17 and
 90 wheel 21. In order to definitely fix the points at which these projections 17 and 21 will disengage the pin 15, I prefer to make the bearing 12, upon which the cam 7 is journaled, eccentric with respect to the shaft 3, as shown
 95 in Figs. 1 to 9, instead of concentric, as illustrated in Figs. 14 and 15. By so forming the bearing 12 and by so locating the pin 15 that it is in its medial position during its forward
 100 travel and by so placing the pin 17 that in its rotation it will encounter the pin 15, as indicated in Fig. 9, it will be obvious that since the path of the pin 17 is a circle whose center is the center of the shaft 3 and since the path of the pin 15 is a circle whose center is the center of the bearing 12 when the pins 15 and 17 arrive at the positions 15' and 17' (indicated by the dotted lines) the pins will be out
 105 of contact. The pin 15 has a radial movement with respect to the pin 17, which carries it entirely clear of the same, and by properly proportioning the width or thickness of the pins with respect to the amount of eccentricity of the bearing 12 the point of clearance of the pins may be readily made such as
 110 to leave the cam 7 in the desired position. Obviously the amount of radial travel of the pins with respect to each other is twice the distance between the centers of the bearing 12 and the shaft 3, and the thickness of the pins should be such that this travel carries them out of engagement. The movement of
 115 the cam 7 just referred to brings it into the position shown in Figs. 8, 3, and 5. In this position the feed-nut is out of engagement with the feed-screw, and the cam 7 by an arrangement which I will now describe will be in
 120 engagement with the return-screw 6. This may be accomplished in several ways. For instance, the cam 7 may be provided with an

interior groove 22 and the bearing 12 with a corresponding exterior groove 23. Situated within the said grooves is a spring 24, having one end bent, as at 25, and held in the body of the cam 7 and having the other end 26 formed with a projection which is adapted to engage the thread of the screw 6. The bottom of the groove 23 is cut out for a short distance to form an opening 27, through which the projection 26 may pass when in the position shown in Fig. 8, and thereby engage the thread of the screw 6. The face of the projection 26 is preferably made sloping, as shown, so that when the cam 7 is turned from the position of Fig. 8 the projection 26 will easily ride up the edge of the opening 27 and follow the groove 23 around to the position of Fig. 9. When the cam 7 is in the position of Fig. 8, the return-screw causes it to travel and carry the sound-box carriage rapidly to its rear or initial position. The lowering operation is exactly similar to the lifting operation previously described. The pin 15 being in the position shown in Fig. 8 will be engaged by one of the teeth of the wheel 21 and will be carried around to the position 15'', (indicated in dotted lines in the figure,) where on account of the eccentricity of its path with respect to the path of the engaging tooth it will be disengaged therefrom. This movement brings the cam 7 into the position of Figs. 4, 6, and 9, and the sound-box will then be in operative position, the feed-nut in engagement with the feed-screw, and the operations described will be repeated.

It is not necessary that the center of the bearing 12 be above the center of the shaft 3, as in Figs. 8 and 9, as it may be situated at any angle thereto. Thus in Figs. 12 and 13 the center of the bearing 12 is below the center of the shaft 3. In this case the opening 27 in the bottom of the groove 23 will be at the top of the bearing and the point of the tooth carried by the cam 7 for engaging the thread of the screw 6 will be situated at that part of the cam where the metal is the deepest, and it will therefore be feasible to use for this purpose a small plunger or pawl 28, seated in a cavity 29 and pressed by a small spiral spring 30. This form is in other respects similar to the form shown in Figs. 8 and 9.

In case the center of the bearing 12 is situated laterally with respect to the center of the shaft 3, as shown in Figs. 10 and 11, the cam 7 will perform a lifting and lowering operation as before. The pin 15, however, should be located so as to be engaged by the pin 17 when in the position indicated in full lines, Fig. 11, since the pins will become disengaged when they arrive at the positions 15' and 17'. It should be noted that in this construction in order that the pin 15 may be in its medial position at the time it is engaged by the pin 17 the inclination of the bearing 12 and

cam 7 must be such as would be obtained by turning the sleeve 8 ninety degrees toward the right from Figs. 8 and 9.

It will be observed that it is only by reason of the inclination of the cam 7 with respect to the shaft 3 that I am able to obtain a support for the sleeve 8 to hold the same against rotation. The pin 15 is of such length as to pass to the left of the projection 9, Fig. 1, by which the sleeve 8 is held, and the pin 17 will clear the projection 9 and contact with the pin 15 at the proper time.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and means for elevating said sound-box comprising a sleeve traveling on said return-screw shaft, and a cam rotatably mounted on said sleeve, substantially as set forth.

2. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and means for elevating said sound-box comprising a sleeve traveling on said return-screw shaft and a cam rotatably mounted on said sleeve on a bearing whose axis is inclined to the axis of said return-screw shaft, substantially as set forth.

3. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and means for elevating said sound-box comprising a sleeve traveling on said return-screw shaft and a cam rotatably mounted on said sleeve on a bearing eccentric to the axis of said return-screw shaft, substantially as set forth.

4. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft and means for elevating said sound-box comprising a sleeve traveling on said return-screw shaft and a cam rotatably mounted on said sleeve on a bearing whose axis is inclined and eccentric to the axis of said return-screw shaft, substantially as set forth.

5. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and means for elevating said sound-box comprising a sleeve traveling on said return-

screw shaft, a cam rotatably mounted on said sleeve, and means for holding said sleeve against rotation, substantially as set forth.

6. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and means for elevating said sound-box comprising a sleeve traveling on said return-screw shaft, a cam rotatably mounted on said sleeve on a bearing whose axis is inclined to the axis of said return-screw shaft, and means for holding said sleeve against rotation, substantially as set forth.

7. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, and a lifting-cam traveling back and forth on the return-screw, and means for operating said cam, substantially as set forth.

8. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft and a lifting-cam traveling back and forth on the return-screw, said cam being provided with means for engaging the thread of the return-screw, substantially as set forth.

9. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam, a sleeve traveling back and forth on the return-screw shaft and rotatably supporting said cam, said sleeve being apertured, and means rotatable with the cam for engaging the thread of the return-screw through said aperture, substantially as set forth.

10. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam traveling back and forth on the

return-screw, and means rotating with said shaft for operating said cam at the end of its forward travel, substantially as set forth.

11. In a return attachment for phonographs and allied talking-machines, the combination of a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam traveling back and forth on the return-screw shaft, and means rotating with and adjustable on said shaft for operating said cam at the end of its forward travel, substantially as set forth.

12. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam traveling back and forth on the return-screw shaft and means rotating with said shaft for operating said cam at the end of its rearward travel, substantially as set forth.

13. In a return attachment for phonographs and allied talking-machines, the combination of a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam traveling back and forth on the return-screw shaft and means rotating with and adjustable on said shaft for operating said cam at the end of its rearward travel, substantially as set forth.

14. In a return attachment for phonographs and allied talking-machines, the combination with a traveling sound-box and means for progressively moving the same when in its operative position, of a return-screw shaft, a lifting-cam traveling back and forth on the return-screw shaft, and means rotating with said shaft for operating said cam, substantially as set forth.

This specification signed and witnessed this 15th day of June, 1905.

EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
ANNA R. KLEHM.

No. 810,652

PATENTED JAN. 23, 1906.

W. H. HOYT & W. J. GAVEN.

SIEVE.

APPLICATION FILED JAN. 6, 1905.

Fig. 1.

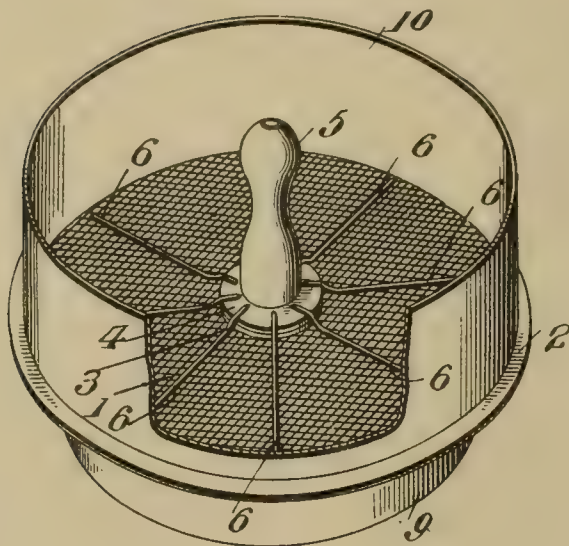


Fig. 2.

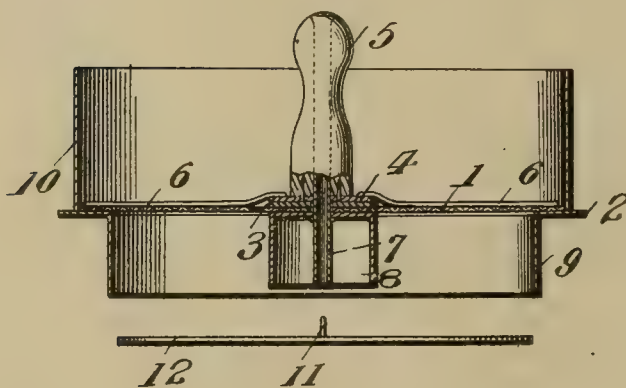
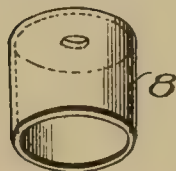


Fig. 3.



Witnesses

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Gustave R. Thompson.

Inventors

William H. Hoyt and
William J. Gaven,

By *Mauro, Cameron, Lewis & Massie*
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM HELM HOYT AND WILLIAM JOSEPH GAVEN, OF BRIDGEPORT,
CONNECTICUT, ASSIGNORS TO THE BURT COMPANY, OF HACKENSACK,
NEW JERSEY, A CORPORATION OF NEW JERSEY.

SIEVE.

No. 810,652.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed January 6, 1905. Serial No. 239,936.

To all whom it may concern:

Be it known that we, WILLIAM HELM HOYT and WILLIAM JOSEPH GAVEN, of Bridgeport, Connecticut, have invented a new and useful
5 Improvement in Sieves, which invention is fully set forth in the following specification.

The present invention relates to an improvement in sieves or sifters for accurately applying on any desired surface a continuous layer of uniform thickness of powder or
10 other finely-divided material.

Though susceptible to other uses, the invention is particularly useful in the manufacture of duplicate sound-records of the
15 "flat" or disk type wherein as the first step in the production of such duplicate records a continuous layer of "glaze" or shellac (which is to constitute the face of the duplicate sound-record) of practically uniform thickness is deposited on the face of the matrix from which the duplicate records are to be made, as set forth in our application, Serial No. 236,074, filed December 8, 1904.

The invention will be better understood by
25 reference to the accompanying drawings, wherein—

Figure 1 is a perspective view of the improved sieve. Fig. 2 is a vertical sectional view thereof, and Fig. 3 is a detail.

30 Referring to the drawings, 1 is the usual mesh or wire-netting constituting the bottom of the sieve and secured in any suitable manner, as by soldering, to a ring or border 2 of sheet-steel or other material. A disk 3, of tin or other material, is secured to the center of the mesh 1 and forms a bearing whereon a similar disk 4 rests and rotates. To disk 4 is secured a handle 5, of any desired shape and material, and also a plurality of wires or
40 fingers 6. The disk 4, handle 5, and wires 6, which together constitute the "clearing" means for effecting the deposit of the material, are firmly connected and rotate together.

45 Through the handle 5 extends a tube 7, the upper end of which is slightly upset to engage with the top of handle 5 and hold it in place. This tube 7 also extends through disks 3 and 4 and wire mesh 1 and passes
50 through a perforation in the closed end of a can or cylinder 8, of tin or other suitable material, and to which it is firmly secured in any

suitable manner. This cylinder 8 is secured to the wire mesh 1 beneath the disk 3 and is in size equal to that of the ordinary label 55 which is affixed to the center of duplicate sound-records of the flat or disk type. Beneath the wire mesh 1 is secured to the ring 2 by soldering or otherwise a continuous circular strip 9 of any suitable material of a diameter equal to that of the matrix, so as to confine the deposit of material to the surface of the matrix, and another continuous circular piece of material 10 is secured to the upper side of the wire mesh in any suitable 65 manner and constitutes the hopper for the retention of the material. The tube 7 besides holding the handle 5 in position is adapted to engage at its lower end a pin 11 on the center of the matrix 12 to exactly center the sieve thereabove. 70

As will be understood from the foregoing, when it is desired to effect a deposit of material on the desired surface—a matrix, for example—the material to be deposited is placed 75 in the sieve, the tube 7 is caused to engage the pin 11 at the center of the matrix 12, and the sieve is lowered, thus closely confining the matrix by the strip 9, the label portion of the matrix being shielded by the can or cylinder 8. A turn is then given to the handle, which, causing the wires or fingers to move through the material in the sieve, effects the deposit on the matrix of a continuous layer or stratum of uniform thickness. 85

What is claimed is—

1. In a sieve, the combination of a clearing device, means for confining the deposit of material to the desired surface; means for centering the sieve over said surface, and means 90 for protecting a portion of said surface from the deposit of material thereon.

2. In a sieve, the combination of a clearing device, means for confining the deposit of material to the desired surface, means for centering the sieve over said surface, and means 95 resting on said surface and protecting a portion thereof from the deposit of material thereon.

3. In a sieve, the combination of the wire 100 mesh, a clearing device, means for confining the deposit of material to the desired surface, means for centering the sieve over said surface, and a cylinder secured to the center of

the under side of the wire mesh to protect a portion of said surface from the deposit of material thereon.

4. In a sieve, the combination of the wire mesh, a clearing device, means for centering the sieve over the surface on which material is to be deposited, and a cylinder secured to the center of the under side of the wire mesh to protect a portion of said surface from the deposit of material thereon.

5. In a sieve, the combination of the wire mesh, a clearing device, a cylinder secured to the center of the under side of the wire mesh to protect a portion of the surface on which the material is to be deposited, and means arranged within said cylinder for centering the sieve over said surface.

6. In a sieve, the combination of the wire

mesh, a clearing device, a cylinder secured to the center of the under side of the wire mesh to protect a portion of the surface on which the material is to be deposited, and a guide in the center of the cylinder for centering the sieve over the desired surface.

7. In a sieve, a foraminous material constituting the sieve proper, and means carried thereby and confining to an annular space the material deposited by said sieve.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM HELM HOYT.

WILLIAM JOSEPH GAVEN.

Witnesses:

W. J. GUGGENHEIM,

GEORGE SWEENEY, Jr.

No. 810,981.

PATENTED JAN. 30, 1906.

B. L. RINEHART.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 25, 1903.

Fig 1

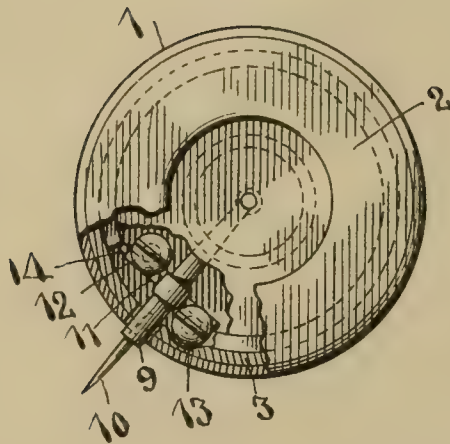


Fig 2.

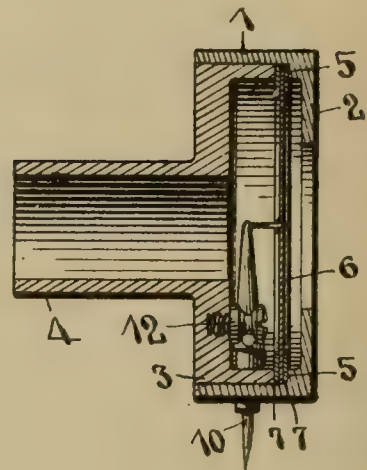


Fig 3.

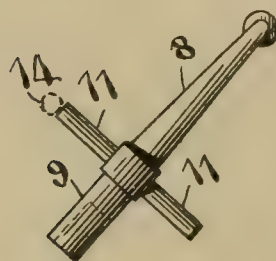
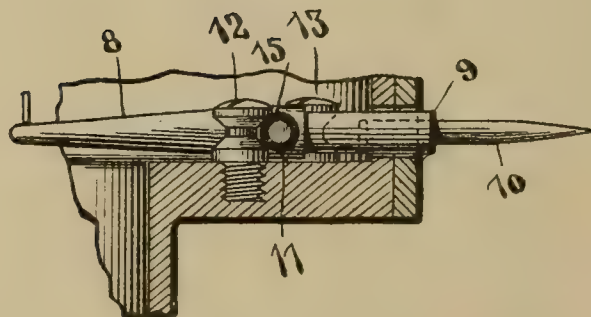


Fig 4.



WITNESSES:

F. J. Hartman

Edw. W. Vaile Jr.

INVENTOR

Bentley L. Rinehart

BY

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ATTORNEY.

UNITED STATES PATENT OFFICE.

BENTLEY L. RINEHART, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 810,981.

Specification of Letters Patent.

Patented Jan. 30, 1906.

Application filed July 25, 1903. Serial No. 166,942.

To all whom it may concern:

Be it known that I, BENTLEY L. RINEHART, a citizen of the United States, and a resident of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

My invention relates to sound-boxes for talking-machines, and particularly to that part of the same which is known as the "stylus-bar," and comprises means for mounting the same upon the sound-box, whereby the same is more efficiently held in position, while at the same time greater freedom of movement is allowed to the action of the stylus-bar and stylus in connection with the talking-machine record.

For a full, clear, and exact description of my invention reference may be had to the following specification, and to the accompanying drawings, forming a part thereof, in which—

Figure 1 shows a side elevation of a sound-box with the supporting portion thereof and the diaphragm removed; Fig. 2, a vertical longitudinal section of a complete sound-box; Fig. 3, a view showing the stylus-bar detached from the sound-box, and Fig. 4 a view showing a modified form of my invention.

In the drawings the numeral 1 indicates the cylindrical casing of the sound-box proper, and 2 its end plate.

3 indicates a cylindrical portion upon which the cylindrical portion 1 is driven and which carries the tubular portion 4, which is connected with the amplifying-horn or other sound-conveying device.

5 indicates a flange which is adapted, in connection with the end of the tubular portion 3, to hold the diaphragm 6 in position, elastic washers 7 being inserted between the diaphragm and the retaining parts to give yielding support.

The stylus-bar comprises a tapering portion 8 and an end portion 9, which has a socket therein to receive the stylus or needle 10. This stylus may be held within the socket in any suitable manner, such as by a set-screw or by the use of magnetism, such as I have described in my former application, Serial No. 147,763, filed March 14, 1903. Adjacent the end portion 9 of the stylus-bar are provided trunnions or studs 11, which are adapted to have bearings in the grooved screws 12 and

13, carried by the sound-box casing. The screw 13 is adapted to bear upon the lower side of one trunnion 11, while the screw 12 is adapted to bear upon the upper side of the opposite trunnion. The grooves in these screws preferably have inclined or V-shaped walls, as indicated clearly in Figs. 2 and 4, and the trunnions are adapted to bear upon the tapering sides thereof and do not come in contact with the bottom of the grooves. A pin 14 is provided which is adapted to contact with the upper end of the upper trunnion 11, so that the trunnions may be kept in position longitudinally upon the screws 12 and 13. The end portion 9 of the stylus-bar projects through the usual opening 15 in the sound-box casing. The upper or smaller end of the stylus-bar is connected to the diaphragm 6 in the usual manner by the small wire 16.

In Fig. 4 I have shown a modified form, in which the trunnions 11 are covered with sleeves 15, of rubber or felt or similar yielding or elastic material, which forms a cushion between said trunnions and their bearing-screws 12 and 13, so that harsh and disagreeable sounds which might be transmitted by the stylus-bar to the sound-box casing are obviated, and the tone of the sound produced by the sound-box is thereby improved.

It will be seen that by the construction above described the stylus-bar is held loosely in position when the sound-box is not in use; but when the needle is brought upon the sound-record so as to be inclined thereto at the usual angle there is a tendency to rotate the stylus-bar about a horizontal axis, so that one of the trunnions is forced downwardly into the groove of the screw 15, while the opposite trunnion is forced upwardly into the groove of the screw 12. This position of the stylus-bar also results in a tendency of the trunnions to move longitudinally in an upward direction; but said movement is prevented and the stylus-bar is held in the requisite transverse position by means of the pin 14, which forms a thrust-bearing. In these forms of construction many advantageous results are produced, among which may be mentioned great freedom of movement of the stylus-bar and the fact that in constructing a large number of sound-boxes the bearings or screws when once placed in position will always have the same amount of friction and other effects upon the stylus-bar which will cause all of the sound-boxes so manufactured to have

the same degrees of quality of tone and uniformity of action without the employment of delicate adjusting means, which are liable to become displaced after continuous use. These constructions also do away with the use of springs or other resilient mountings, which vary in their quality, resiliency, and durability in different sound-boxes and at different times in the same sound-box.

10 I do not wish to be limited to the exact form or position of the parts herein set forth, for the same may be varied without departing from the spirit and scope of my invention; but

15 What I claim, and desire to protect by Letters Patent of the United States, is—

1. In a sound-box for talking-machines, a stylus-bar and means for positioning said stylus-bar upon said sound-box so as to allow oscillation thereof, said means being made operative solely by the downward pressure upon the record, caused by the weight of the sound-box and parts carried thereby.

2. In a sound-box for talking-machines, a stylus-bar, and pivot-bearings having parts located respectively upon the stylus-bar and sound-box casing and being held in operative contact solely by the downward pressure upon the record caused by the weight of the sound-box and parts carried thereby.

3. In a sound-box for talking-machines, a stylus-bar and a pivot-bearing therefor, comprising parts located respectively upon the stylus-bar and sound-box casing and having a grooved bearing and coacting pivot, said pivot being held operatively against said bearing solely by the downward pressure upon the record caused by the weight of the sound-box and parts carried thereby.

4. In a sound-box for talking-machines, a stylus-bar, pivot-bearings therefor, comprising grooved parts opening in opposite directions and studs coöperating with said parts and held operatively within said grooves solely by the downward pressure upon the record caused by the weight of the sound-box and parts carried thereby.

5. In a sound-box for talking-machines, a stylus-bar, a fulcrum therefor comprising grooved parts opening in opposite directions and trunnions coöperating therewith and held operatively within said grooves by the downward pressure upon the sound-record caused by the weight of the sound-box and parts carried thereby.

6. In a sound-box for talking-machines, a stylus-bar, a fulcrum therefor comprising parts having V-shaped grooves opening in opposite directions and trunnions coöperating therewith and held operatively within said grooves by the downward pressure upon the record caused by the weight of the sound-box and parts carried thereby.

7. In a sound-box for talking-machines, a stylus-bar, having trunnions, a fulcrum therefor comprising grooved screws adapted to re-

ceive said trunnions and to bear upon the same upon opposite sides of the axis thereof, said trunnions being retained in the grooves by the downward pressure upon the record caused by the weight of the sound-box and parts carried thereby.

8. In a sound-box for talking-machines, a stylus-bar, trunnions carried thereby, grooved screws carried by the sound-box casing, said grooves having V-shaped sides adapted to contact with said trunnions, to hold the stylus-bar in position by the downward pressure upon the sound-record caused by the weight of the sound-box and parts carried thereby and means for locating said trunnions longitudinally.

9. In a sound-box for talking-machines, a stylus-bar, trunnions carried thereby, screws carried by the sound-box casing having V-shaped grooves therein to receive said trunnions, said screws being arranged upon opposite sides of the normal axis of said trunnions so that the stylus-bar is held in position by the downward pressure upon the sound-record, caused by the weight of the sound-box and parts carried thereby.

10. In a sound-box for talking-machines, a stylus-bar, a fulcrum therefor, and yielding material interposed between said fulcrum and its bearing.

11. In a sound-box for talking-machines, a stylus-bar, a fulcrum therefor and a cushioned bearing for said fulcrum.

12. In a sound-box for talking-machines, a stylus-bar, a fulcrum therefor, a bearing for said fulcrum and a cushion of yielding material interposed between said fulcrum and said bearing.

13. In a sound-box for talking-machines, a stylus-bar, trunnions carried thereby, bearings carried by the sound-box casing and having recesses therein to receive said trunnions, and sleeves of yielding material covering said trunnions.

14. In a sound-box for talking-machines, a stylus-bar, trunnions carried thereby, bearings carried by the sound-box casing and having V-shaped grooves therein to receive said trunnions, and sleeves of yielding material covering said trunnions, said trunnions being held in said grooves by the downward pressure upon the record caused by the weight of the sound-box and attached parts.

15. In a sound-box for talking-machines, a stylus-bar and bearings therefor, the parts of said bearings being normally out of operative engagement and held in operative engagement by the contact of the stylus with the record.

In witness whereof I have hereunto set my hand this 20th day of July, A. D. 1903.

BENTLEY L. RINEHART.

Witnesses:

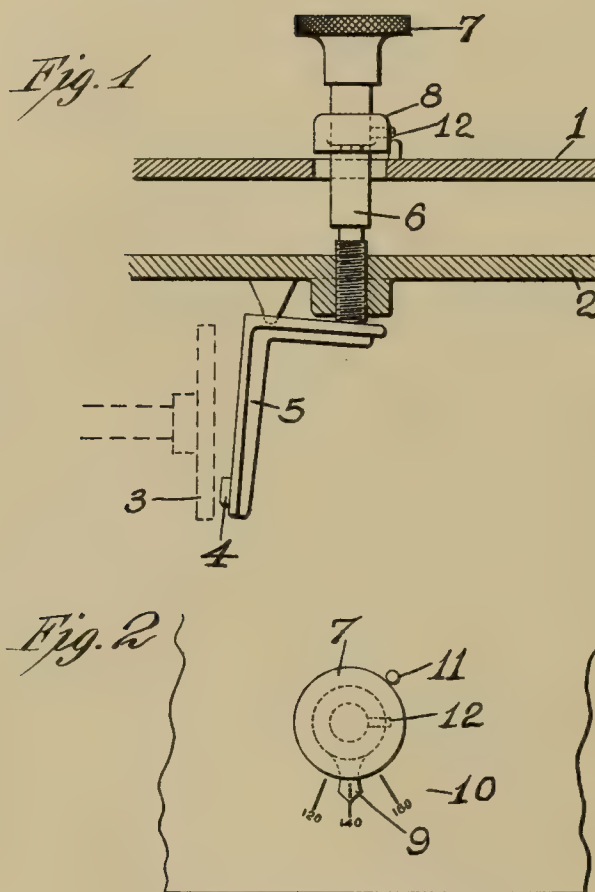
LEWIS H. VAN DUSEN,

EDW. W. VAILL, Jr.

No. 811,010.

PATENTED JAN. 30, 1906.

P. WEBER.
PHONOGRAPH SPEED INDEX.
APPLICATION FILED JUNE 29, 1904.



Witnesses:

Jas. F. Coleman
Harry L. Halter

Inventor
Peter Weber

by Frank L. Spence
Attorney.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH SPEED-INDEX.

No. 811,010.

Specification of Letters Patent.

Patented Jan. 30, 1906.

Application filed June 29, 1904. Serial No. 214,596.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at 571 Park avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Phonograph Speed-Index, of which the following is a description.

My present invention relates to an improved device for addition to an ordinary phonograph for indicating the speed at which the mandrel may be operated. This is a desirable practical requirement, since, as is well known, it is highly important that a phonographic musical record should be reproduced at the same surface speed at which the original master - record was secured, and with present devices the determination of the proper speed is a matter of careful adjustment and with most users a question of mere guesswork.

My invention provides a very simple index by means of which the phonograph may be adjusted at the desired speed without the necessity of any experimental manipulation.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional view of a part of the mechanism of an ordinary phonograph, showing the top plate, motor-frame, governing-lever, governing-disk, and adjusting-screw, with my present improvements applied thereto; and Fig. 2, a top view looking down on the adjusting-screw.

In both of the views corresponding parts are represented by the same reference-numerals.

The top plate 1 carries the motor-frame 2 in the usual way. The high-speed shaft of the spring-motor (not shown) drives the governor-disk 3, with which coöperates a pad 4 on the governing-lever 5. As the speed of the motor increases, the governor-disk 3 is drawn into engagement with the pad 4 until

the friction developed tends to retard any further acceleration in the speed and maintains the speed constant at a point determined by the position of the governing-lever. Engaging the governing-lever is adjusting-screw 6, working in the motor-frame 2 and having a milled head 7, by which it may be turned. The parts so far described are of the usual construction.

Mounted on the adjusting-screw 6 is a collar 8, carrying an index 9, which coöperates with a scale 10 on the top plate. A stop 11 is engaged by the index 9 to prevent the adjusting-screw from being turned more than a complete rotation, so that when the index 9 corresponds with any figure on the scale 10 the speed of the motor will correspond to that figure. The collar 8 is adjustably mounted on the shank of the adjusting-screw 6 and secured in a position by a set-screw 12, so that the parts can be readjusted from time to time to accommodate any slight wear of the pad 4 or any lost motion in the operating parts.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. The combination with the governor-disk, governing-lever and adjusting-screw of a spring-operated phonograph, of an index carried by the adjusting-screw and coöperating with a stationary scale, and means for preventing the adjusting-screw from being turned more than a complete revolution, substantially as set forth.

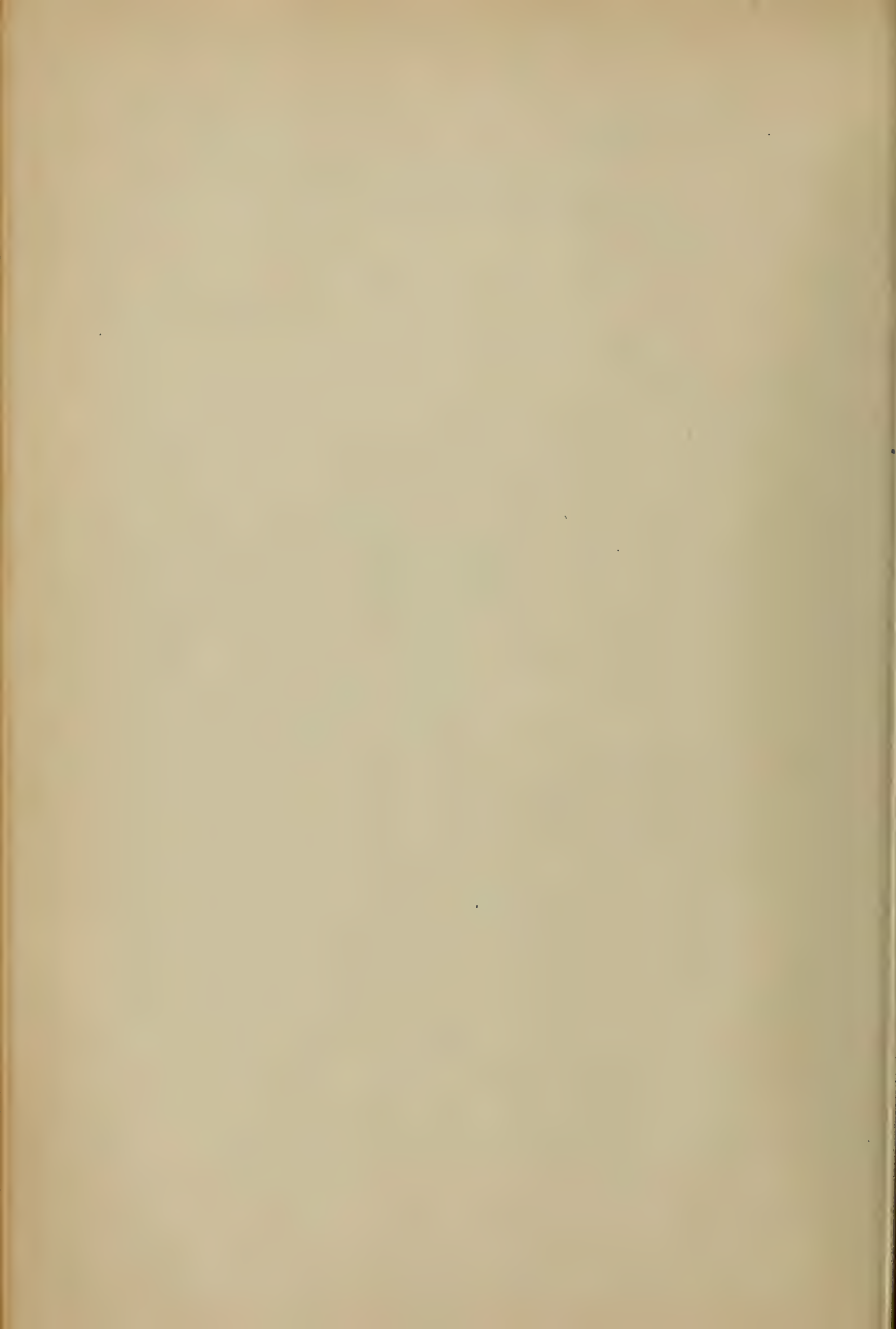
2. In a phonograph or the like, and in combination with the speed-adjusting screw, of a finger adjustably carried by the screw, and a stop in the path of said finger.

This specification signed and witnessed this 28th day of June, 1904.

PETER WEBER.

Witnesses:

HARRY G. WALTERS,
MINA C. MACARTHUR.



No. 811,295.

PATENTED JAN. 30, 1906.

J. O. HOUSER.
ATTACHMENT FOR MUSICAL INSTRUMENTS.

APPLICATION FILED MAR. 29, 1905.

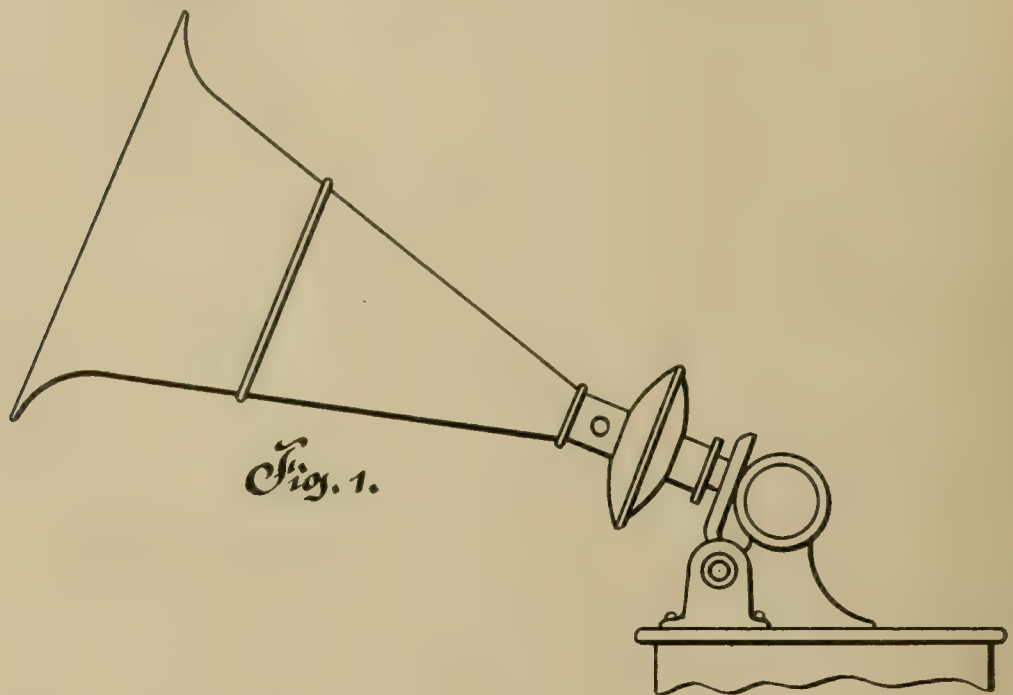


Fig. 1.

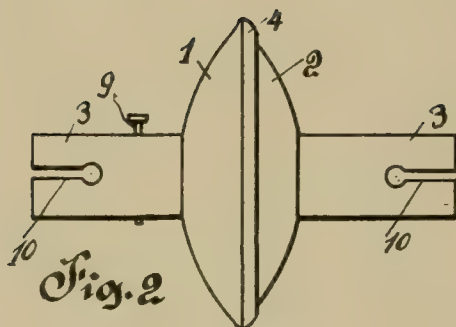


Fig. 2

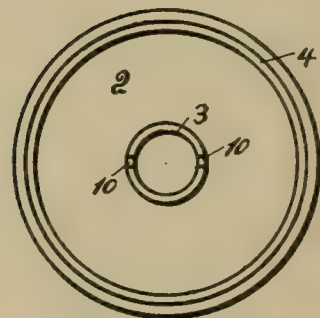


Fig. 3.

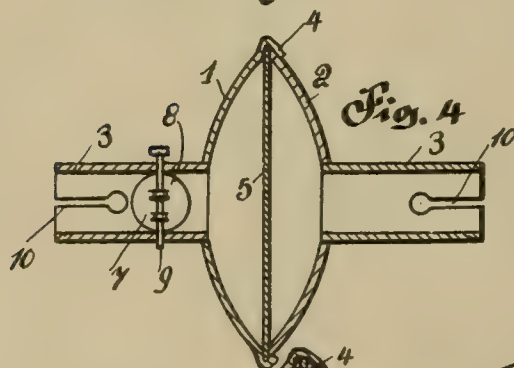


Fig. 4

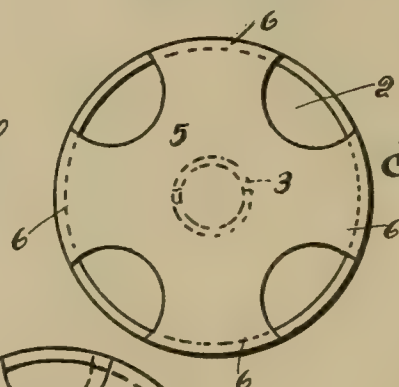


Fig. 5



Fig. 6

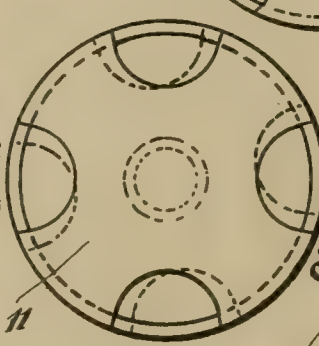


Fig. 7

Witnesses:
H. W. Butler
C. Klostermann

Inventor.
John. O. Houser.
by H. C. Ewert & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN O. HOUSER, OF PITTSBURG, PENNSYLVANIA.

ATTACHMENT FOR MUSICAL INSTRUMENTS.

No. 811,295.

Specification of Letters Patent.

Patented Jan. 30, 1906.

Application filed March 29, 1905. Serial No. 252,719.

To all whom it may concern:

Be it known that I, JOHN O. HOUSER, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Attachments for Musical Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in attachments for musical instruments, and more particularly to an attachment adapted to be used in connection with graphophones, phonographs, and the like reproducing musical instruments.

The primary object of my invention is to provide an attachment for improving the sonorous qualities of an instrument and to regulate the volume of tone produced by an instrument, at the same time maintaining a mellow and soft sound.

It is a well-known fact that some musical instruments, such as graphophones, at times produce harsh and penetrating sounds which are disagreeable to the ear and at other times produce sounds that are hardly audible, the tones of which are indistinct and cannot be appreciated. My attachment aims to eliminate the harsh notes or sounds produced by the musical instrument and to improve the indistinct and inaudible sounds or notes of an instrument. To this end I have devised an attachment which can be used in connection with different types of musical instruments, such as horns, and the construction of the attachment enables me to manufacture the same at a comparatively small cost, at the same time maintaining a construction of durable nature.

With the above and other objects in view the invention finally consists in the novel construction, combination, and arrangement of parts, which will be hereinafter more fully described and then specifically pointed out in the claims, and, referring to the drawings accompanying this application, like numerals of reference designate corresponding parts throughout the several views, in which—

Figure 1 is a side elevation of a graphophone equipped with my improved attachment. Fig. 2 is a side elevation of the attachment. Fig. 3 is an end view of the same. Fig. 4 is a vertical sectional view of the attachment. Fig. 5 is an end view of a portion of my improved attachment, illustrating a

diaphragm used in connection with the attachment. Fig. 6 is a vertical sectional view of a modified form of construction that may be used in connection with the attachment, and Fig. 7 is an end view of a portion of the same.

In the accompanying drawings I have illustrated the attachment as applied to a graphophone simply to show the manner in which it is used with such an instrument.

The attachment proper, which is illustrated in Figs. 2 to 5, inclusive, consists of two members 1 and 2, each of which is provided with an outwardly-extending tube or pipe 3. These members 1 and 2 are substantially in the form of segments of spheres, preferably of different peripheral diameters for a purpose as will presently appear. The periphery of the member 1 is preferably of a greater diameter than the periphery of the member 2, whereby when these members are placed in engagement with one another the periphery 4 of the member 1 can be bent inwardly or reamed to engage the member 2 and form a casing for a diaphragm 5. This diaphragm is preferably made of thin sheet steel, rubber, or the like resilient metal or material, and the diaphragm is substantially the shape in top plan view of a Maltese cross, the peripheral edges 6 6 of the diaphragm being retained between the peripheries of the members 1 and 2.

One of the tubes or pipes 3 is provided with a regulator 7 substantially of a damper form, this regulator consisting of a circular plate 8, mounted upon a rod 9, journaled transversely of the pipe 3. The ends of the pipes 3 3 are slotted, as indicated at 10 10, to permit of the ends being contracted or expanded, as it may be desired, when securing my improved attachment upon an instrument.

In Figs. 6 and 7 of the drawings I have illustrated a slight modification of my improved attachment, which resides in dispensing with the form of regulator illustrated in Fig. 4 of the drawings and employing an auxiliary or secondary diaphragm 11, similar in construction to the diaphragm 5 heretofore described. The diaphragm 11 coincides with the diaphragm 5 and is rotatably mounted between the members 1 and 2.

I have employed the regulators for improving and controlling the volume of sound passing through my improved attachment, it being possible by the adjustment of the regu-

lators to limit or confine the sounds emitted from a musical instrument equipped with my improved attachment.

5 The vibrations of the diaphragm are adapted to improve weak and inaudible sounds and to reduce the harsh and penetrating sounds to mellow tones pleasant to the ear. My improved attachment serves as a mute for instruments and when properly regulated is
10 capable of regulating the sound facilities of any instrument to which it is applied.

What I claim, and desire to secure by Letters Patent, is—

1. An attachment for musical instruments
15 consisting of two members, an outwardly-extending pipe carried by each member, the ends of said pipes being slotted, a regulator mounted in one of said pipes, a diaphragm interposed between said members, and means
20 to secure said members together, substantially as described.

2. An attachment for musical instruments consisting of two members substantially in the form of segments of spheres, a diaphragm
25 interposed between said members, a regulator carried by one of said members, and

means to secure said members together, substantially as described.

3. The combination with a musical instrument, adapted to produce sounds, of an attachment consisting of two members substantially in the form of segments of spheres, a diaphragm mounted between said members, means to secure said members together, and means to regulate the sounds passing
35 through said attachment, substantially as described.

4. In an attachment for musical instruments, the combination with an instrument capable of producing a sound, of two members, a diaphragm mounted between said members, means to secure said members together, means to regulate the sounds passing through said members, and means to secure said members to said musical instrument,
45 substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN O. HOUSER.

Witnesses:

H. C. EVERT,
E. E. POTTER.

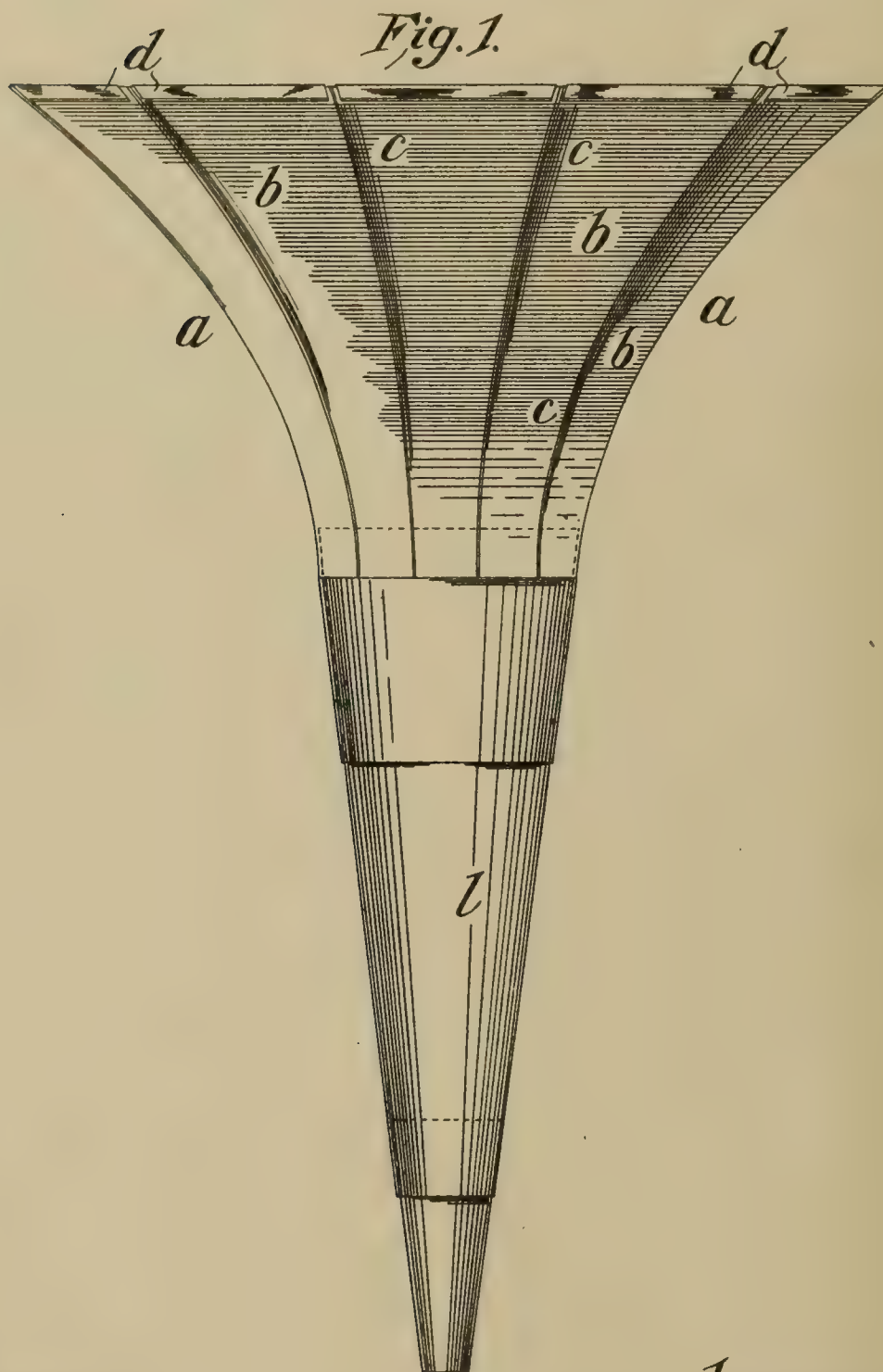
No. 12,442.

REISSUED JAN. 30, 1906.

G. H. VILLY,
HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.

APPLICATION FILED OCT. 26, 1905.

3 SHEETS—SHEET 1.



Witnesses

C. H. Andrews.

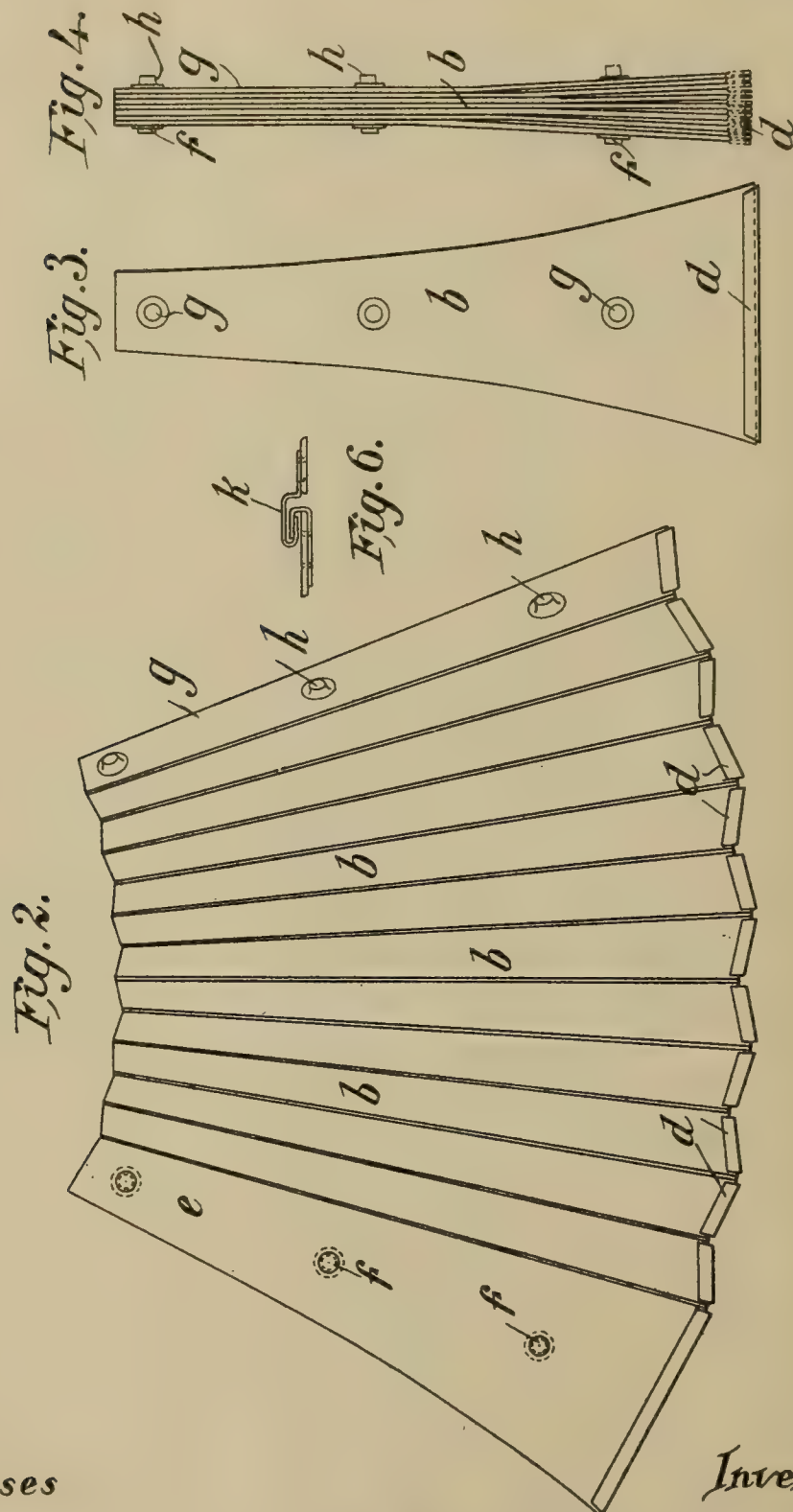
J. B. Additt

Inventor

By His Gustave Harman Villy
Attorney O. H. H. Kney

G. H. VILLY.
HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.
APPLICATION FILED OCT. 26, 1905.

3 SHEETS—SHEET 2.



Witnesses
C. H. Andrews
J. B. Addicks

Inventor
By His Gustave Herman Villy
Attorney C. B. Stickney

No. 12,442.

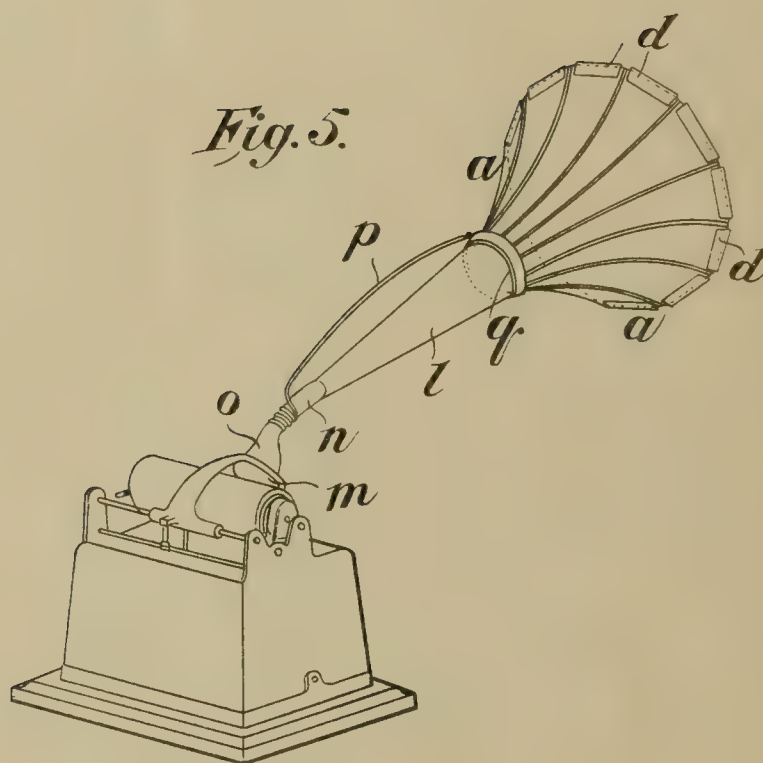
REISSUED JAN. 30, 1906.

G. H. VILLY.

HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.

APPLICATION FILED OCT. 26, 1905.

3 SHEETS—SHEET 3.



Witnesses

E. H. Andrews

J. F. Adsett

Inventor

By His Gustave Harmon Villy
Attorney B. H. Stickney

UNITED STATES PATENT OFFICE.

GUSTAVE HARMAN VILLY, OF MANCHESTER, ENGLAND, ASSIGNOR TO
UNITED STATES HORN COMPANY, OF NEW YORK, N. Y., A CORPO-
RATION.

HORN FOR PHONOGRAPHS, EAR-TRUMPETS, &c.

No. 12,442.

Specification of Reissued Letters Patent.

Reissued Jan. 30, 1906.

Original No. 739,954, dated September 29, 1903. Application for reissue filed October 26, 1905. Serial No. 284,581.

To all whom it may concern:

Be it known that I, GUSTAVE HARMAN VILLY, a subject of the King of Great Britain and Ireland, residing at 5 Longford Place, Longsight, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Connection with Horns for Phonographs, Ear Instruments, and for Like Purposes, (for which I have made application for Letters Patent in Great Britain, No. 20,146, and dated 15th day of September, 1902,) of which the following is a specification.

This invention relates to improvements in connection with horns or trumpet-like sound distributors or collectors for use upon phonographs, gramophones, and other like instruments, and also for ear-trumpets, fog-horns, and other sound distributing and collecting devices, the object being to provide a horn or trumpet-like device which can be folded when not in use, so as to be capable of ready transportation and for placing within the case of the phonograph or in the pocket of the user when it is to be applied to an ear instrument or the like.

The accompanying drawings represent one form of the invention.

Figure 1 is an elevation of the complete or erected horn. Figs. 2, 3, and 4 are detail views illustrating the manner in which the horn can be collapsed or folded. Fig. 5 is a perspective view illustrating one convenient application of the improved horn to a phonograph. Fig. 6 is a detail view on an enlarged scale.

In carrying my invention into effect in one convenient manner when making my folding horn for use, particularly in connection with a phonograph or like instrument, I make the end *a* of trumpet-like or curved configuration with an enlarged outer end and a smaller end at the interior of the conoidal-like form. I make this enlarged and trumpet-like device by employing a series of strips *b* of paper, wood, linen, or other preferably flexible material, the foundations of which I prefer to make of linen or the like, so as to form a hinge-like connection *c* between each of the strips, the members *b* of which I arrange so that while lying close together when extended there is a dividing-line between them, about which they can be folded upon the base of

linen or the like connecting-web, upon which the paper or other material is mounted. The longitudinal hinged edges *c* of the flexible segments or sectors *b* are curved in such manner that although the segments when opened out cannot lie in the same plane they can either be folded together in a zigzag manner, so as to lie parallel to one another, as shown in Figs. 2 to 4, or extended by springing or buckling into the requisite trumpet or bell-like form, as shown in Figs. 1 and 5. The angles formed by the meeting of the hinged segments when extended form, as it were, ribs, giving rigidity to the trumpet form. The outer ends of the segmental-like strips I prefer to protect by a bent or turned-over edging *d* of metal, making the connection rigid by pressing a portion of the strip of metal or other binding material into the edge of the paper or the like foundation.

Upon the extreme member *e* of the series of strips *b* thus formed into one band I provide eyelets *f* or other clip-like devices for enabling snap projections *h* on the opposite end strip *g* to be engaged therewith and when thus engaged to form a completed trumpet-like sound-distributor.

Instead of arranging eyelets or hook-like clips upon the outer members of the series of strips I may make one to engage with the other by forming a bead-like connection or flange *k* upon one member, into which the corresponding projecting or engaging portions of the other may enter, as shown in Fig. 6. When providing for an extension and a long funnel-like carrier for the built-up trumpet-like end *a* to engage with, I sometimes make a conical tube *l*, the enlarged end of which engages with the inner end of the trumpet-terminal *a*, while the smaller end of the cone engages with the receiver *m* of the phonograph or enters into the rubber or other tubular or flexible connection which may be employed for use upon any particular instrument. I prefer to make this extended or carrying member *l* for the collapsible trumpet from paper or other suitable material built up in a similar manner to that hereinbefore described to my collapsible end, or the cone may be made in a short length in one piece or it may be made telescopic when so desired.

When providing for a flexible connection at the extreme end of the cone *l*, I attach a

length of rubber or the like tubing n , which I bind with metal or other band at the end for the purpose of inserting it upon the funnel o of the phonograph-reproducer, and I stiffen the combination trumpet and funnel with flexible end by providing one or more bars p of metal or the like stiffeners which support the funnel by means of elastic or other connections q , arranged upon the cone end and suspended from the projecting stiffening hook or members p , carried from the metal end or binder of the flexible tube n .

When constructing a funnel or tube for an ear-trumpet or for a fog or speaking horn or the like, I employ the same method of building up the segments to form the expanding surface, modifying the arrangement of the inner end to suit the connection that is to be made therewith, so that when the trumpet is in use it can be extended and a large outer area exposed for the collection of sound and when not in use it can be folded each segment upon the other, so as to occupy but little space—that is to say, a trumpet such as illustrated in Figs. 1 to 4 would be suitable as an ear-trumpet.

I am aware that it has hitherto been proposed to form conical or pyramidal horns from cardboard provided with a linen foundation; but such horns have been made up from a single flat scored sheet or from a number of flat triangular strips having straight edges. Such horns could be developed or laid out upon a flat surface. Owing to their formation, if such horns were made collapsible they would have to be sustained in their conical form by additional sustaining means, or if they were made self-sustaining they could not be made collapsible. In contradistinction to this my collapsible horn could not be made up from a single flat sheet, as each strip has to be made with curved edges, and when the strips are flexibly secured together at such curved edges the whole or complete surface so formed cannot be laid out or developed on a flat surface. My horn, owing to the curvature of the edges of the strips, is self-sustaining and requires no additional stiffening or sustaining devices, although when it is desired to collapse the horn this may be effected by forcibly straightening and folding the strips one against the other in the manner hereinbefore described with reference to Figs. 2, 3, and 4. The horn when erected offers a decided resistance to such straightening or folding sufficient to render it self-sustaining against all ordinary shocks liable to be encountered; but it is found that when one strip has been forcibly straightened or folded against another the equilibrium of the trumpet is destroyed and the whole may be easily collapsed.

I do not limit the application of my invention to any particular method of building up the segments or to any special curve or con-

figuration of the same, and I vary the method of jointing and stiffening them to suit the material from which the strips are constructed and the foundation or base fabric upon which the flexible material forming the strips is secured.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising of a number of flexible strips having curved meeting edges substantially as set forth.

2. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges and mounted on a flexible foundation, substantially as and for the purposes hereinbefore set forth.

3. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges, a flexible foundation for said strips and means for detachably securing the two extreme strips together, substantially as set forth.

4. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges, flexible connections between such edges and protecting means on the outer exposed edges, substantially as set forth.

5. A phonograph-horn, ear-trumpet or the like comprising a rigid conical tube and a collapsible trumpet-shaped mouth, the latter being made up of a number of flexible strips having curved meeting edges, and flexible connections at such edges, substantially as hereinbefore set forth.

6. A horn of the class described comprising a rigid conical tube, and a collapsible trumpet-shaped mouth made up of a number of flexible strips having curved meeting edges, said mouth being connected to said rigid conical tube, substantially as described.

7. A horn of the class described comprising a rigid conical tube, and a collapsible trumpet-shaped mouth made up of a number of flexible strips having curved meeting edges, said mouth being telescopically connected to said conical tube, substantially as described.

8. A phonograph-horn or the like comprising a number of flexed strips having curved meeting edges, and means joining said edges, said strips being so flexed and said edges so curved and joined that the horn is given a trumpet-like or bell-like form, the strips forming angles where said edges meet.

9. A phonograph-horn or the like comprising a number of strips each having a foundation or facing of linen or the like, said strips being so flexed and their edges so curved and joined that the horn is given a trumpet-like

or bell-like form, the strips forming angles where said edges join or meet.

10 10. A phonograph-horn comprising a number of strips joined or meeting at their edges, 5 said strips being so flexed and said edges so curved that the horn is given a trumpet-like or bell-like form, the strips forming angles where said edges join, and protecting means on the outer exposed edges or ends of the 10 strips.

15 11. A horn comprising a funnel-like portion and a trumpet-shaped mouth portion, the latter comprising a number of strips provided with means joining them at their 15 edges, said strips being flexed and said edges curved so as to produce the trumpet form of said mouth portion, and said strips having angular relation to one another, substantially as described.

20 12. A phonograph-horn comprising a number of flexed strips having curved meeting edges, means joining said strips edge to edge, said strips being so flexed and said edges so curved and joined that the horn is given a 25 trumpet-like or bell-like form, the strips forming angles where said edges meet, and

protecting devices applied upon the outer exposed edges or ends of the strips.

13. A phonograph-horn comprising a funnel-like portion and a mouth portion, the latter 30 comprising a number of side portions extending lengthwise of the horn and joining one another at their borders, forming angles where joining, said sides so curved at their corner portions and so flexed as to give the 35 mouth portion a trumpet-like or bell-like form, and their outer exposed ends being provided with protecting means.

14. A horn comprising a funnel-like portion and a trumpet-shaped mouth portion, 40 the latter comprising a number of strips or sides provided with means joining them at their edges, said strips being flexed and said edges curved so as to produce the trumpet form of said mouth portion, and said strips 45 having angular relation to one another, and protecting means on the outer exposed edges or ends of the strips.

GUSTAVE HARMAN VILLY.

Witnesses:

DORA VILLY,

ROBERT MORRISON NEILSON.

No. 811,568.

PATENTED FEB. 6, 1906.

G. A. MANWARING.
GRAPHOPHONE REPRODUCER.
APPLICATION FILED JAN. 12, 1904.

Fig. 1.

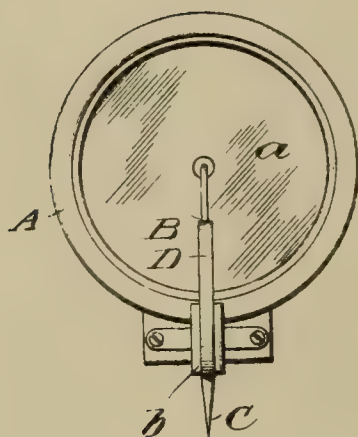


Fig. 2.

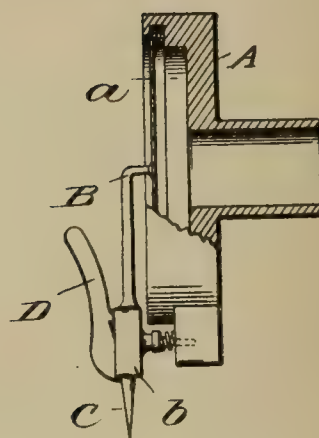


Fig. 3.

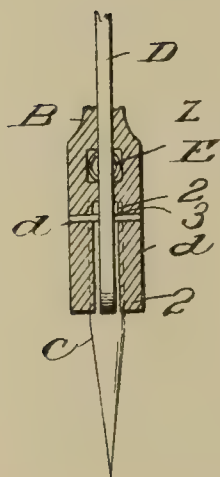
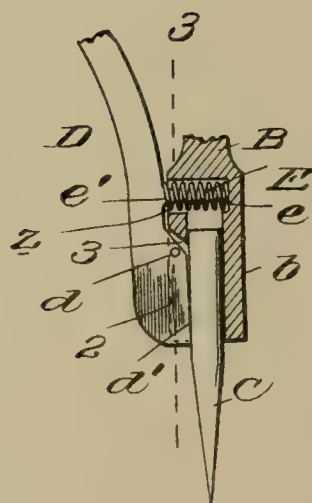


Fig. 4.



Inventor

George A. Manwaring.

Witnesses

Wm B. Kerkham.
Gustave R. Thompson.

By *Mauro. Cameron. Lewis. Massie*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE ABBOTT MANWARING, OF BAYONNE, NEW JERSEY, ASSIGNOR TO
AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF
COLUMBIA, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE-REPRODUCER.

No. 811,568.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed January 12, 1904. Serial No. 188,795.

To all whom it may concern:

Be it known that I, GEORGE ABBOTT MANWARING, of Bayonne, county of Hudson, State of New Jersey, have invented a new and useful Graphophone-Reproducer, which invention is fully set forth in the following specification.

My invention relates to means for securing in place the needle of a reproducer, and its purpose is to permit the needle to be readily inserted in place and to expedite the substitution of a fresh needle for an old one. At the present time these needles are held in the needle-receiving barrel by a set-screw, and to put in a fresh needle the screw has to be turned several revolutions, and then after the old needle is removed and the new needle put in place the screw has to be turned back several revolutions, all of which calls for considerable time and trouble. By means of my present invention most of this is avoided. The use of a split spring-socket for holding the needle has also been proposed; but no means (such as a lever) have been provided for releasing the pressure upon the needle to permit ready removal of the same and substitution of a fresh needle.

My invention will best be understood by reference to the accompanying drawings, showing the preferred embodiment thereof, in which—

Figure 1 is a face view, and Fig. 2 is a side view, partly broken away, of a reproducer equipped with my novel means for holding the needle in place. Fig. 3 is a sectional view through the barrel of the stylus-bar on line 3, Fig. 4, the stylus-clamping lever being shown in elevation. Fig. 4 is a longitudinal sectional view at right angles to Fig. 3.

A is a reproducer, and B is a stylus-bar attached thereto and secured at one end to the diaphragm *a*, while at its outer end is the usual barrel *b* for receiving the needle, all of which is as usual. Instead of securing the needle C in place by a set-screw, as heretofore, I make use of the following construction. The longitudinal slot 2 in the side of the barrel communicates with the central bore thereof, and a transverse seat 3 is made, as indicated. In this slot 2 is pivoted, as at *d*, a lever D, whose lower end enters the slot 2 and is held against the needle C by a spring E, that is seated in the transverse opening or re-

cess *z* through the side wall of the barrel and opening into the central bore of the barrel at its closed upper or inner end. The coiled spring E rests at its inner end against a seat *e* and at its other or outer end encircles a projection *e'* on the lever D above its pivot *d*. At its clamping end the lever has an elongated straight gripping surface or face *d'*, making extended contact with the straight side of the needle, thereby rigidly holding the latter in its socket and avoiding relative movement of the parts, which would prevent accurate and faithful operation of the parts when actuated by a sound-record groove to transmit vibrations to the diaphragm. Above the pivot *d* the lever D is in the form of a handle or projection suitable for manually depressing the lever on its pivot against the tension of spring E.

The mode of operation is obvious. Push the handle of lever D toward the reproducer, (to the left in Figs. 2 and 4,) insert the needle, and release the handle, whereupon the needle will be securely held in place. To put in a fresh needle, press the handle as before and let the old needle drop out, whereupon a new needle may be readily inserted.

Having thus described my invention, I claim—

1. In a reproducer, the combination of a needle-receiving barrel having an axial bore and having also a longitudinal slot communicating with said bore for substantially the full length of the latter, and a spring-pressed lever pivoted in the upper end of said slot and having its lower face located entirely within said slot, whereby said face may present an extended bearing-surface against the side of an unnotched needle, the upper end of said lever being extended to provide a thumb-piece.

2. In a reproducer, a diaphragm, a stylus-bar connected therewith, a needle barrel or socket at one end of the stylus-bar, a hand-operable clamping-lever pivoted to the barrel and having an elongated gripping-surface extending longitudinally of the barrel and adapted to make extended engagement with the surface of a needle when in place in the barrel, and a spring acting on the lever to normally press its gripping-surface into clamping engagement with the needle.

3. In a reproducer, a diaphragm, a stylus-

bar connected therewith, a needle barrel or
socket at the outer end of the stylus-bar, a
hand-operable clamping-lever pivoted to the
barrel and extending longitudinally with re-
5 lation thereto, said lever having on one side
of its pivot toward the open end of the barrel
a gripping-face adapted to engage the sur-
face of a needle in the barrel through a slot
or opening in the wall of said barrel, and a
10 coiled spring housed in a transverse recess or
chamber opening at one side of the barrel
said spring pressing at its outer end against

the lever on the other side of its pivot thereby
normally forcing the gripping-surface of said
lever into clamping engagement with the 15
needle.

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

GEORGE ABBOTT MANWARING.

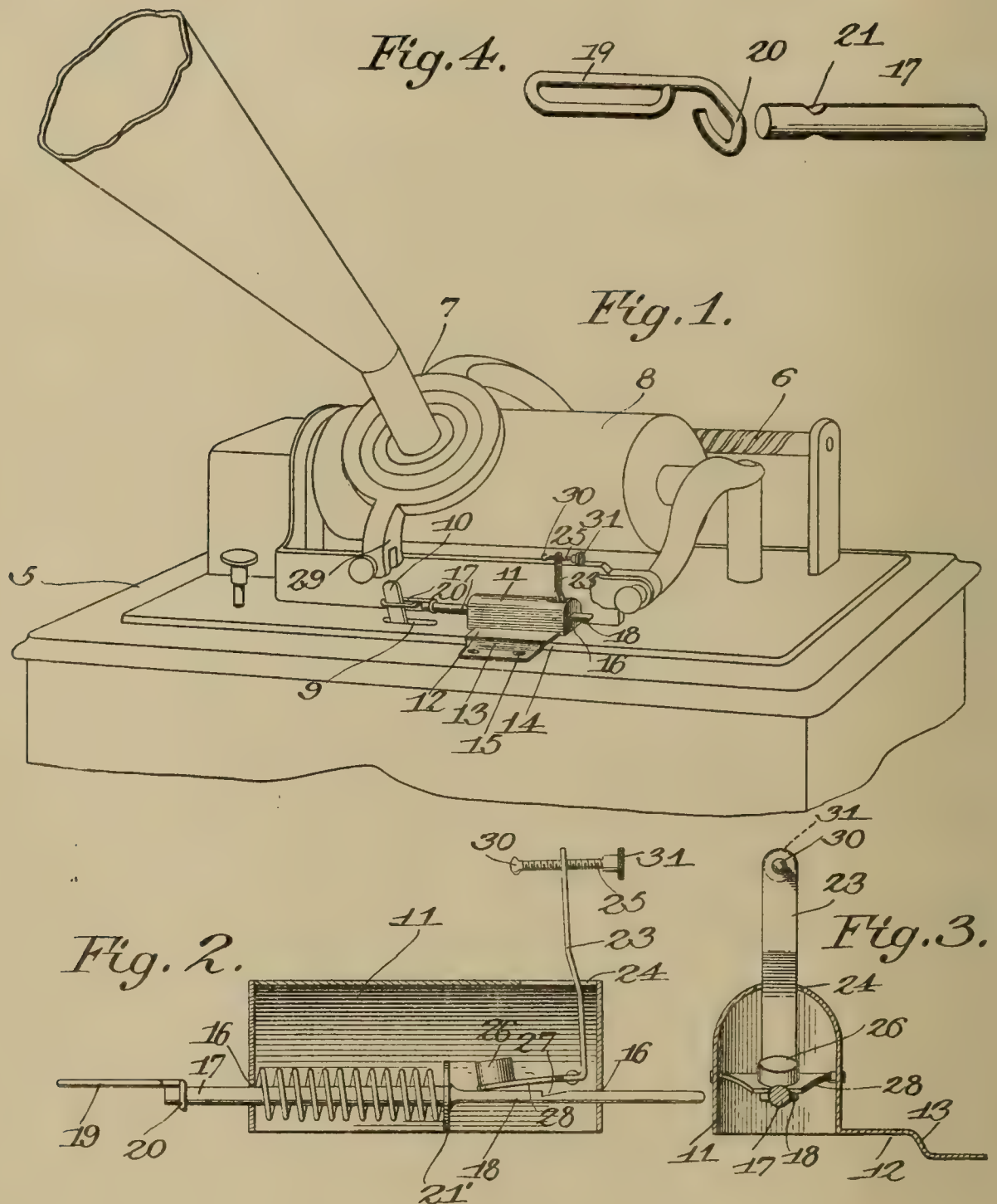
Witnesses:

C. A. L. MASSIE,
RALPH LANE SCOTT.

No. 811,633.

PATENTED FEB. 6, 1906.

Z. T. GROVER.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JAN. 24, 1905.



Witnesses
E. J. Stewart
J. H. McKee

Zenas T. Grover, Inventor.
by *C. A. Snow & Co.* Attorneys

UNITED STATES PATENT OFFICE.

ZENAS TARBLE GROVER, OF SOUTH NEW BERLIN, NEW YORK.

ATTACHMENT FOR PHONOGRAPHS.

No. 811,633.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed January 24, 1905. Serial No. 242,548.

To all whom it may concern:

Be it known that I, ZENAS TARBLE GROVER, a citizen of the United States, residing at South New Berlin, in the county of Chenango and State of New York, have invented a new and useful Attachment for Phonographs, of which the following is a specification.

This invention relates to certain improvements in phonographs, graphophones, and similar sound-producing machines, and more particularly to a novel form of mechanism for automatically operating the motor-brake after the sound-box has entirely completed the reproduction of the record.

The object of the invention is to provide a simple, inexpensive, and efficient device of this character capable of being used in connection with any of the well-known forms of sound producing and recording machines and which will automatically apply the brake to the motor, and thereby positively stop the latter when the machine has finished playing a record.

A further object of the invention is to provide a trip-lever adapted to be engaged by the reproducer-arm to automatically apply the brake, said trip-lever being provided with a longitudinally-adjustable pin or screw whereby the device may be set for stopping the actuating-motor at any predetermined time.

With these and other objects in view the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

In the accompanying drawings, forming a part of this specification, Figure 1 is a perspective view of a phonograph, showing my improved brake-applying device applied thereto. Fig. 2 is a longitudinal sectional view of the device detached. Fig. 3 is a transverse sectional view of the same, and Fig. 4 is a detail perspective view of the connecting-link and a portion of the rod detached.

Similar numerals of reference indicate cor-

responding parts in all the figures of the drawings.

The improved brake-applying device may be used in connection with any of the approved forms of phonographs or graphophones in which a motor is employed for reciprocating the sound-box carriage, and by way of illustration I have shown the device attached to the well-known "Edison" type of machine, in which 5 represents the cabinet or stand, 6 the threaded traversing or feed shaft, and 7 the sound-box mounted for travel on said shaft over the surface of the cylindrical record 8.

Extending through a slot 9 in the cabinet or stand is a brake-lever 10, operatively connected with a spring, weight, electric, or other motor, (not shown,) the latter being arranged within the casing and connected by a belt or suitable gearing to the traversing-shaft 6 for moving the sound-box carriage over the surface of the record. The several parts of the machine above described are of well-known construction and form no part of this invention, the essential feature of which consists of a housing or casing 11, containing the mechanism for automatically applying the brake. The casing 11, which is preferably formed of a single piece of metal, is mounted on the top of the stand or cabinet to one side of the brake-lever, as shown, and is provided with a laterally-extending flange 12, having a shoulder 13 to accommodate the base 14 of the machine, and one or more openings adapted to receive screws or similar fastening devices 15, by means of which the casing is secured in position on the cabinet.

The opposite end walls of the casing are provided with alined openings 16 for the reception of a spring-actuated bolt or rod 17, one end of which is flattened laterally, as indicated at 18, while the opposite end thereof is provided with a link 19, which fits over the free end of the brake-lever. The link 19 is detachably secured to the rod 17 and is provided with an angularly-disposed terminal spring ring or loop 20, which engages a recess 21 in the end of said rod, so as to prevent accidental displacement of the former. Loosely mounted on the rod 17 is a washer or disk 21', which bears against the flattened portion 18 of the rod, and mounted on said rod and interposed between the washer and one end of

the casing is a coil-spring 22, the normal tendency of which is to exert a longitudinal pull on the brake-lever when the link is in engagement therewith. Pivoted within the casing 5 11 above the rod 17 is a bell-crank trip-lever 23, the long arm of which extends through a slot 24 in the top of the casing and is provided with a threaded opening for the reception of an adjusting-screw 25, while the short arm of 10 the lever is weighted, as indicated at 26, and adapted to engage a locking-notch 27 in the flattened end of the rod 17 when said trip-lever is in set position. It will thus be seen that when the free end of the rod 17 is forced 15 rearwardly the short arm 28 of the trip-lever will drop by gravity and engage the notch in the rod 17, and when the sound-box has entirely completed the reproduction of the record the depending arm 29 of the former will 20 engage the screw 25 and tilt the trip-lever, thereby permitting the spring to force the rod 17 forward and apply the brake to the actuating-motor.

The adjusting-screw is provided at one end 25 with an enlargement 30, adapted to receive the impact of the sound-box, and at the opposite end thereof with a milled head 31, by means of which the screw may be adjusted to adapt the device for stopping the motor at 30 any predetermined position on the record. The adjustability of the screw 25 is an important feature, inasmuch as the sound-waves reproduced on the record-cylinder terminate at varying distances from the end of the 35 same, and it is highly desirable to stop the motor as soon as the machine has completed the reproduction of the record in order to prevent injury to the stylus and to obviate the disagreeable rasping sound usually produced when the motor is allowed to run after 40 finishing the record.

It will of course be understood that the device may be used for applying any particular style of brake and that the same may be positioned at any convenient place on the machine and actuated by any of its moving 45 parts. It will also be understood that instead of employing a spring-pressed rod for operating the motor-brake a weight, lever, 50 spring, or similar device may be used without departing from the principle of the invention.

From the foregoing description it will be seen that I have provided an extremely simple and inexpensive attachment for phonographs, graphophones, and other sound-producing machines which is operable by the movement of the reproducer-arm to automatically apply the motor-brake.

Having thus described the invention, what 60 is claimed is—

1. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box carriage mounted for travel on said shaft, a

trip-lever actuated by the sound-box carriage for controlling the brake, and an adjustable 65 impact-pin carried by the trip-lever.

2. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box carriage mounted for travel on said shaft, a weighted trip-lever actuated by the sound- 70 box carriage for controlling the brake, and a threaded impact-pin adjustably mounted on one end of the trip-lever.

3. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box 75 carriage mounted for travel on said shaft, a spring-actuated rod connected to the brake and provided with a locking-notch, and a trip-lever adapted to engage the notch in the rod to hold the same in set position, said lever 80 being actuated by the sound-box to release the rod and operate the brake.

4. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box carriage mounted for travel on said shaft, a 85 spring-actuated rod connected to the brake and provided with a locking-notch, and a pivoted bell-crank trip-lever the short arm of which is weighted and adapted to engage said notch for holding the rod in set position, said 90 lever being actuated by the sound-box carriage to release the rod and operate the brake.

5. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box carriage mounted for travel on said shaft, a 95 spring-actuated rod connected to the brake and provided with a locking-notch, a pivoted bell-crank trip-lever the short arm of which is weighted and adapted to engage said notch for holding the rod in set position, and an adjustable impact-pin carried by the long arm 100 of the lever for engagement with the said box-carriage.

6. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box 105 carriage mounted for travel on said shaft, a casing provided with alined openings, a spring-actuated rod slidably mounted in the openings of the casing and provided at one end thereof with a locking-notch, a bell-crank 110 trip-lever pivoted within the casing and having its short arm weighted and adapted to engage the locking-notch for holding said rod in set position, the long arm of said lever passing through an opening in the top of the casing for engagement with the said box-carriage. 115

7. In a phonograph, the combination with a motor-brake, of a feed-shaft, a sound-box mounted for travel on said shaft, a casing 120 provided with alined openings, a rod slidably mounted in said openings and provided with a locking-notch, a detachable link engaging the rod and connected to the brake, a plate carried by the rod, a spring interposed between the plate and the casing, a bell-crank 125

trip-lever pivoted within the casing the short
arm of which engages the notch in the rod for
holding the latter in set position, and an ad-
justable impact-pin carried by the long arm
5 of the lever for engagement with the sound-
box carriage.

In testimony that I claim the foregoing as

my own I have hereto affixed my signature in
the presence of two witnesses.

ZENAS TARBLE GROVER.

Witnesses:

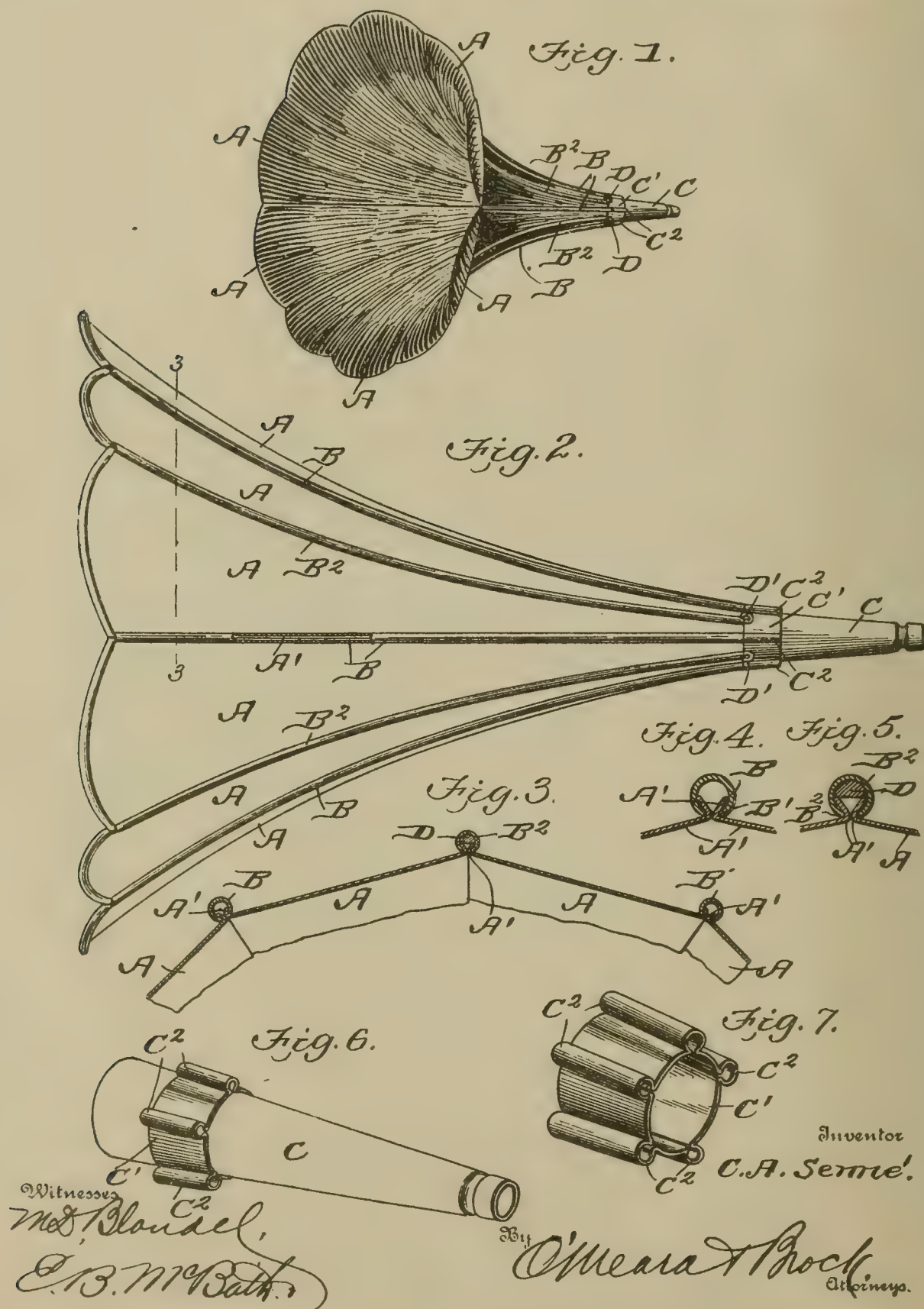
CHAS. LITTLEFAIR,
ALLAH L. MORSE.

No. 811,877.

PATENTED FEB. 6, 1906.

C. A. SENNÉ.
PHONOGRAPH HORN.
APPLICATION FILED NOV. 1, 1904.

2 SHEETS—SHEET 1.

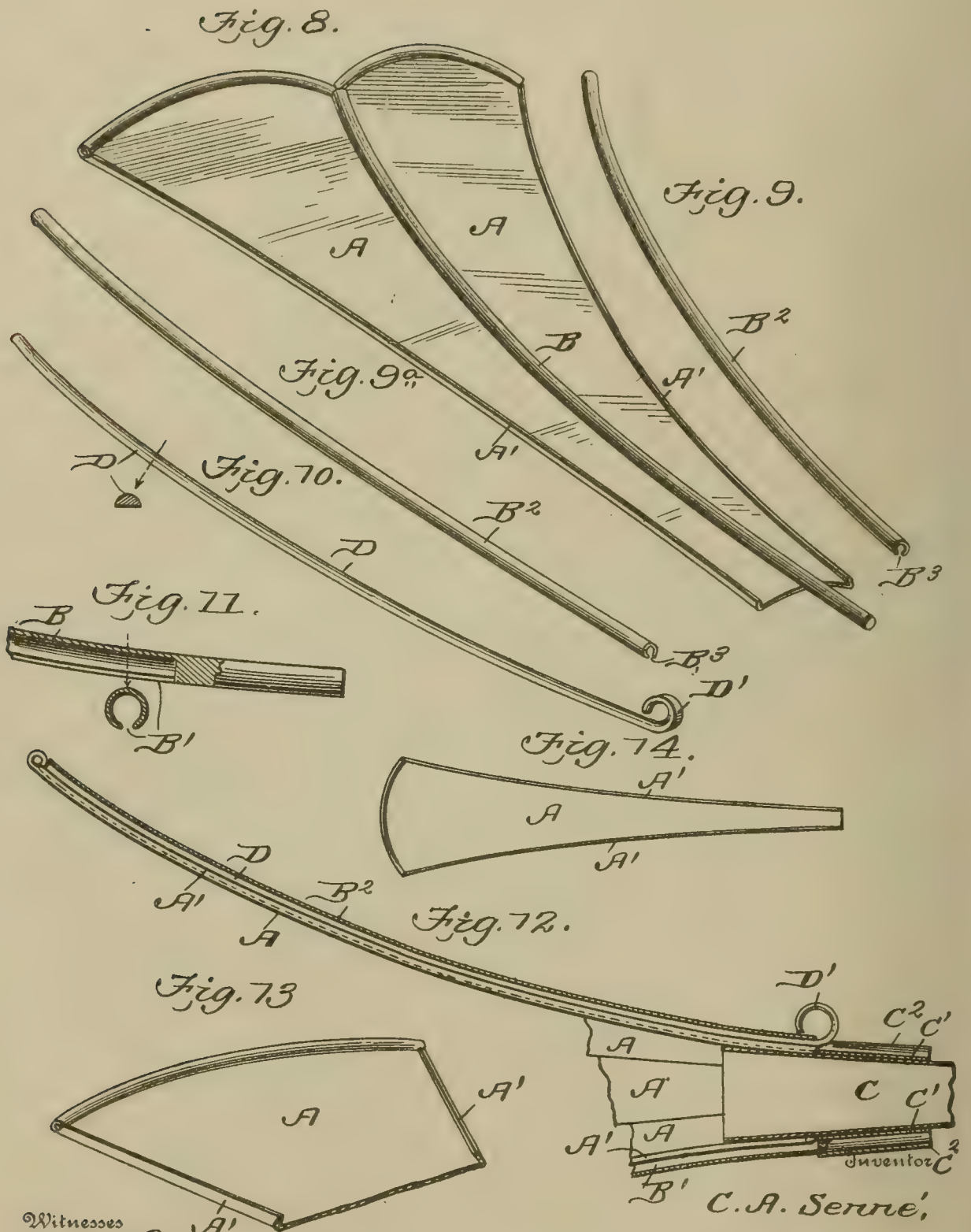


No. 811,877.

PATENTED FEB. 6, 1906.

C. A. SENNÉ.
PHONOGRAPH HORN.
APPLICATION FILED NOV. 1, 1904.

2 SHEETS—SHEET 2.



Witnesses
McCloudel,
E. B. McBeth.

By *O'Meara & Brock,*
Attorneys.

UNITED STATES PATENT OFFICE.

CAMILLUS ANTONETTE SENNÉ, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 811,877.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed November 1, 1904. Serial No. 231,003.

To all whom it may concern:

Be it known that I, CAMILLUS ANTONETTE SENNÉ, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improved Phonograph-Horn, of which the following is a specification.

This invention relates to an improved collapsible horn especially designed for use in connection with phonographs and the like, the object being to provide a horn that may be "knocked down," so that it may be readily packed in a small space and also that its transportation may be facilitated.

With these briefly-stated objects in view, the invention consists in providing a series of blades or sections, each having their edges formed with flanges over which is secured a locking-rib, by which the sections are securely held together, and sleeves having tubular portions engaging alternate ribs, the device as a whole being in the shape of a horn.

The invention also comprises means for holding the horn to the tube-nozzle, which is also employed for locking the sections and holding the horn in a perfectly secure condition.

The invention further consists in certain details of construction and novelties and combinations of parts as will be fully described in the following specification and pointed out in the claims, reference being had to the drawings, in which—

Figure 1 is a perspective view of a horn constructed in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a detail section on the line 3 3 of Fig. 2. Figs. 4 and 5 are enlarged detail sections drawn through the uniting-ribs and flanges. Fig. 6 is a detail perspective view of the tube-nozzle, showing my improvement arranged therein. Fig. 7 is a detail perspective view of my improved sleeve that fits upon the tube-nozzle. Fig. 8 is a detail perspective view of one of the sections of the horn. Figs. 9 and 9^a are detail views of the hollow uniting-ribs. Fig. 10 is a detail view of one of the strips which are arranged in the ribs. Fig. 11 is a detail section of the inner end of one form of uniting-rib. Fig. 12 is a longitudinal section drawn through one of the uniting-ribs and the tube-nozzle. Fig. 13 is a detail perspective view of the outer end of one of the blades, and Fig. 14 is a detail plan view of a complete blade.

In constructing a horn in accordance with

my invention, I employ a series of blades or strips A, which may be of any suitable material, each being wider at its outer end and tapering upon a curved line to its inner end, so that when all of the blades are assembled they will produce a horn having a flaring mouth, or, in other words, bell-shaped; but this special design is not essential, as the tapering blades may be perfectly straight upon their longitudinal edges, in which case a horn shaped like a truncated cone will be produced. The longitudinal edges of each blade are bent outwardly and inwardly to provide a flange A', over which is placed a tubular rib B, having slots B' arranged upon their lower longitudinal surface through which the flanges project, and by bending the flanges, as described, when the ribs are arranged thereon the sections will be firmly and securely locked together. In practice I propose to arrange these blades in pairs or sections, as shown in Fig. 8 of the drawings, and to permanently retain the ribs B thereon and to provide the ribs of a greater length than the blades, so that their inner ends will project slightly beyond the inner ends of the sections, the projected ends being made solid to add strength to the ribs. In order to hold these sections in position, I provide a tube-nozzle C with a sleeve or band C', which is made of a single length of material and bent at regular intervals to provide a series of tubular sections or barrels C², and in these barrels the projecting ends of the ribs B are held when the horn is complete. As the blades are arranged in sections, as before described, and the ribs B employed for holding the sections together the opposite flanged edges of each section will be free, and to unite them I employ tubular ribs B², slotted throughout their entire length, as shown at B³, and in practice the ribs B² are slipped over the flanges from their inner ends and pushed thereon until the entire surface of the flanges is covered. Of course it will be understood that these ribs B² are of a length to equal that of the longitudinal edges of the blades A, and in order to securely hold them in position and to securely lock them in position I employ strips D, semicircular in cross-section, which are inserted in the ribs so that their flat surface will engage the edges of the flanges, and their circular edges will engage the inner surface of the ribs and in order to facilitate the withdrawal of the strips D and also their insertion into the ribs I propose to

bend their inner ends back upon themselves, as shown at D'.

In setting up a horn constructed like my invention I first place the sleeve C' upon the hose-nozzle and then take the sections formed by the blades A and insert the projecting ends of the ribs into each of the tubular sections or barrels C². The ribs B² are then pushed over the flanges of the abutting blades, the strips D inserted into the ribs B², and the complete horn is then produced. It will be readily seen that this operation is exceedingly simple, and it is only necessary to withdraw the ribs and strips from the sections and each section disconnected from the nozzle-tube and the sections may be readily packed into a very small space.

In practice I prefer to bend the free ends of the blades at their outer ends back upon the body of the blade in a circular form and to insert a wire therein, which adds to the artistic effect of the device, besides strengthening the outer ends of the blades as well as avoiding sharp surfaces.

From the foregoing it will also be seen that I provide a collapsible horn so constructed that will take up very little space when in a knocked-down form.

I have found from actual experience that when the horn is set up the vibrations caused by the sound are not impaired and a perfectly clear tone is produced.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn comprising a series of blades, each having flanges upon their longitudinal edges, ribs engaging said flanges, and a sleeve having tubular portions in which the alternate ribs are held.

2. A horn comprising a series of blades, each having flanges upon their longitudinal edges, ribs engaging said flanges, a sleeve having tubular portions in which the alternate ribs are held, and a tube-nozzle for supporting the said sleeve.

3. A horn comprising a series of blades, each having flanges upon their longitudinal edges, ribs engaging the flanges, the alternate ribs projecting beyond the inner ends of the blades, a sleeve having tubular sections in which the projecting ends of the ribs are held, a tube-nozzle for supporting the sleeve and strips engaging the remaining alternate ribs.

4. A horn comprising a series of flanged blades arranged in pairs, the blades of each pair being united by means of ribs which extend beyond the inner ends of the blades, tubular ribs for uniting the abutting edges of each pair, and means for engaging the projecting ends of the first-named ribs.

5. A horn comprising a series of blades arranged in pairs each pair having a rib projecting therefrom, a sleeve having tubular portions in which the projected ends of the

ribs are held, tubular ribs for uniting the edges of each pair of blades, strips arranged within the said tubular ribs, and a tube-nozzle for supporting the sleeve.

6. A horn comprising a series of tapering blades, each being flanged upon their longitudinal edges, tubular ribs engaging the abutting flanges of each blade for locking the said blades together, the alternate ribs projecting beyond the inner ends of blades, a sleeve having tubular sections in which the projected ends of the ribs are held, and a tube-nozzle for supporting the sleeve.

7. A horn comprising a series of blades, each being tapered from its outer to its inner end, and flanged along the said tapering edges, tubular ribs engaging the flanges for uniting the blades, the alternate ribs projecting beyond the blades and made solid, strips arranged within the opposite alternate ribs, and a sleeve connected to the projected ends of the ribs.

8. A horn of the kind described, comprising a series of tapering blades arranged in pairs, each blade being flanged upon its longitudinal tapering edges, said blades being arranged in pairs, ribs engaging the flanges to unite the blades to form the pairs, said ribs projecting beyond the inner ends of each pair, a sleeve having tubular portions in which the projected ends of the ribs are held, tubular ribs engaging the abutting flanges of each pair, and strips arranged within the last-named ribs.

9. A horn of the kind described, comprising a series of tapering blades, each having a flange upon its longitudinal edges, said blades being arranged in pairs, and held together by tubular ribs, the ends of which project beyond the inner ends of the blades, a sleeve having tubular portions in which the projected ends of the ribs are held, tubular ribs engaging the abutting flanges of each pair of blades, semi-cylindrical strips arranged within the last-mentioned ribs and engaging the flanges of the blades for the purpose specified.

10. A horn comprising a series of longitudinal tapering blades, each having its longitudinal edges bent outwardly and inwardly to form flanges which diverge when the abutting edges of the flanges are placed together, tubular ribs fitting over the flanges, the alternate ribs projecting beyond the inner ends of the blades, a sleeve having tubular sections in which the said projecting ends of the ribs are held, the remaining alternate ribs being of the same length as the blades, and strips arranged within the last-mentioned ribs, said strips having one end bent to provide a ring all substantially as and for the purpose specified.

CAMILLUS ANTONETTE SENNÉ.

Witnesses:

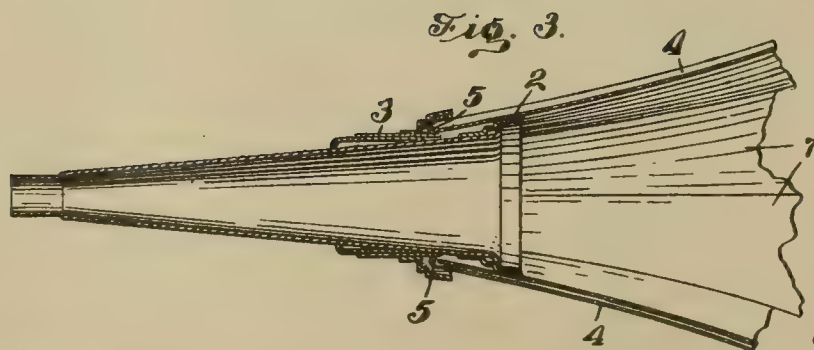
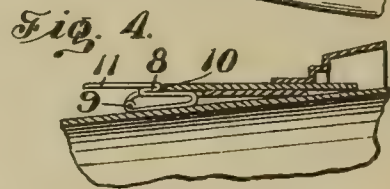
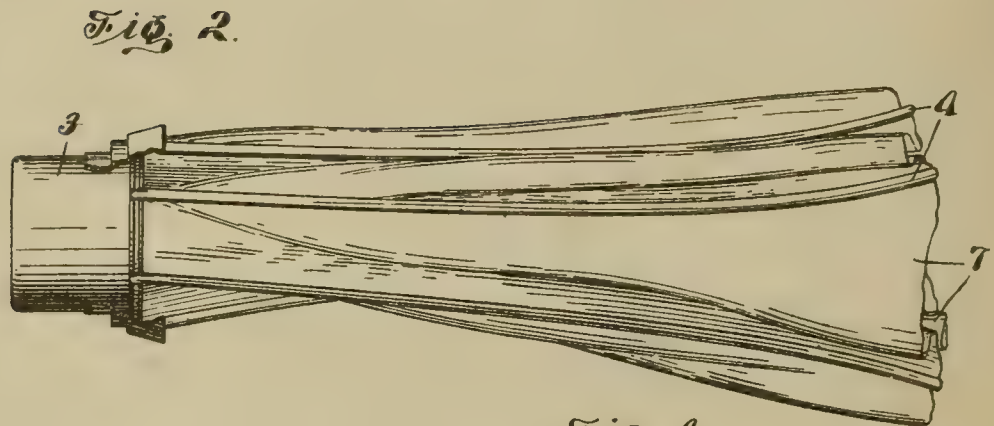
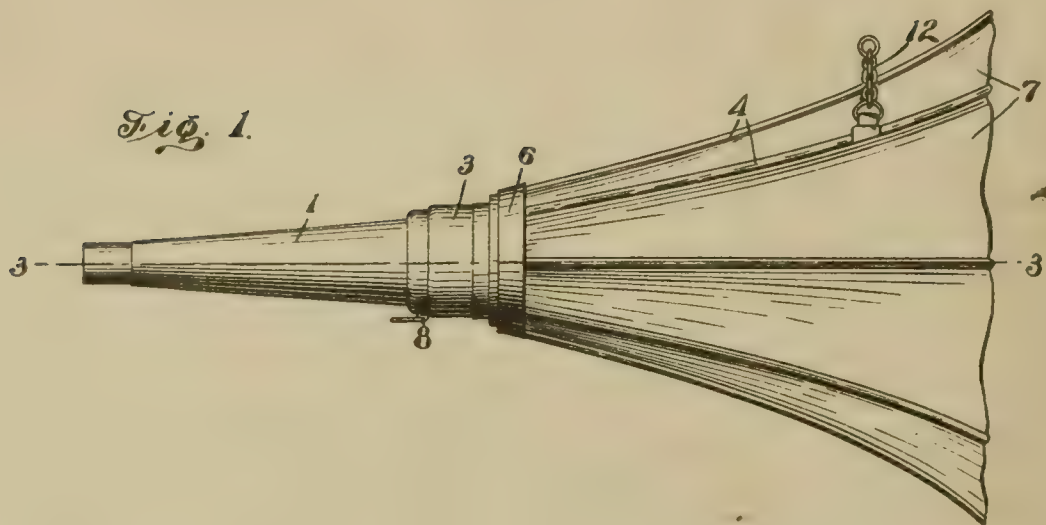
M. D. BLONDEL,
E. M. VENN.

91

No. 811,900.

PATENTED FEB. 6, 1906.

J. T. BROWN.
FOLDING PHONOGRAPH HORN.
APPLICATION FILED DEC. 31, 1904.



Witnesses
H. A. Robinette
C. L. Horn.

Inventor
James T. Brown

By

G. Ayres.

Attorney

UNITED STATES PATENT OFFICE.

JAMES T. BROWN, OF NEW YORK, N. Y.

FOLDING PHONOGRAPH-HORN.

No. 811,900.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed December 31, 1904. Serial No. 239,241.

To all whom it may concern:

Be it known that I, JAMES T. BROWN, a citizen of the United States, residing at 1524 First avenue, in the city, county, and State of New York, have invented a new and useful Folding Phonograph-Horn, of which the following is a specification.

My invention relates to a horn especially adapted for use with phonographs or similar devices; and it consists in the constructions, combinations, and arrangements herein described and claimed.

The objects of my invention are to provide a simple and durable form of collapsible horn which can be conveniently adjusted and which will be held rigidly in its expanded position.

Referring to the accompanying drawings, forming a part of this application, and in which similar reference-symbols indicate corresponding parts in the several views, Figure 1 is a side elevation illustrating one embodiment of my invention in its expanded position. Fig. 2 is a side elevation, partly in section, showing the collapsible portion of the horn in folded position. Fig. 3 is a sectional view on the line 3-3 of Fig. 1. Fig. 4 is a detail sectional view illustrating a preferred form of latch for locking the two portions of the horn together.

Referring especially to Figs. 1 to 4, 1 indicates the rigid mouthpiece of a horn, which may be formed of any suitable metal and which is provided with a tapered annular portion 2 for expanding the foldable portion of the horn. The foldable portion of the horn comprises a stiff sleeve 3, preferably formed of metal, to which an annular series of stiff ribs 4 are pivoted at 5. The sleeve 3 is provided with a tapered annular flange 6 for limiting the outward swing of the ribs 4 about their pivots 5, the limiting-flange 6 of the sleeve and the expanding portion 2 of the mouthpiece preferably being constructed with the same taper for the purpose of securely clamping the ribs 4 rigidly therebetween.

In the construction shown the ribs 4 are constructed of strips of metal bent in U-shaped form for clamping the edges of the suitably-arranged sections 7, of leather or other flexible material. This construction

permits a supporting means, such as a chain 12, to be secured near the outer ends of the ribs, thereby enabling the horn to be supported without undue strain.

The mouthpiece 1 carries a suitable latch 8 for securely locking the two portions of the horn together. As shown, especially in Figs. 1 and 4, this latch may be formed of sheet metal pivoted at 9 to the mouthpiece and provided with a lip 10 for engaging the end of the sleeve 3 when the parts are assembled, a thumb-piece 11 being provided for depressing the latch when it is desired to separate the parts of the horn.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn comprising a mouthpiece, a flexible portion, and cooperating means on said mouthpiece and flexible portion for expanding the latter and clamping it in expanded position, substantially as described.

2. A horn comprising a mouthpiece, a flexible portion, and cooperating tapered means on said mouthpiece and flexible portion for expanding the latter and clamping it in expanded position, substantially as described.

3. A horn comprising a mouthpiece, a flexible portion, cooperating tapered means on said mouthpiece and flexible portion for expanding the latter and clamping it in expanded position, and means for locking said flexible portion on the mouthpiece in expanded position, substantially as described.

4. A horn comprising a mouthpiece, a flexible portion, an annular flange carried by the flexible portion for limiting its expansion, and an expanding portion carried by the mouthpiece for expanding the flexible portion against said flange, substantially as described.

5. A horn comprising a mouthpiece, a flexible portion, a tapered annular flange carried by the flexible portion for limiting its expansion, and a tapered expanded portion carried by the mouthpiece for expanding the flexible portion against said flange, substantially as described.

6. A horn comprising a rigid mouthpiece-section and a collapsible section, said collapsible section being expanded by a movement of one of said sections relatively to the other.

7. A horn comprising a rigid mouthpiece-
section and a collapsible section, the former
telescoping within the latter and operative
to expand the latter by a movement relative
5 thereto.

8. A horn comprising a rigid mouthpiece-
section and a collapsible section, the former

telescoping within the latter and the latter
being expanded by a relatively longitudinal
movement of one of said sections.

JAMES T. BROWN.

Witnesses:

Mrs. L. H. SHERMAN,
FRANK CAPEK.

H. S. MILLS.
GRAMOPHONE.

APPLICATION FILED MAY 3, 1905.

Fig. 1.

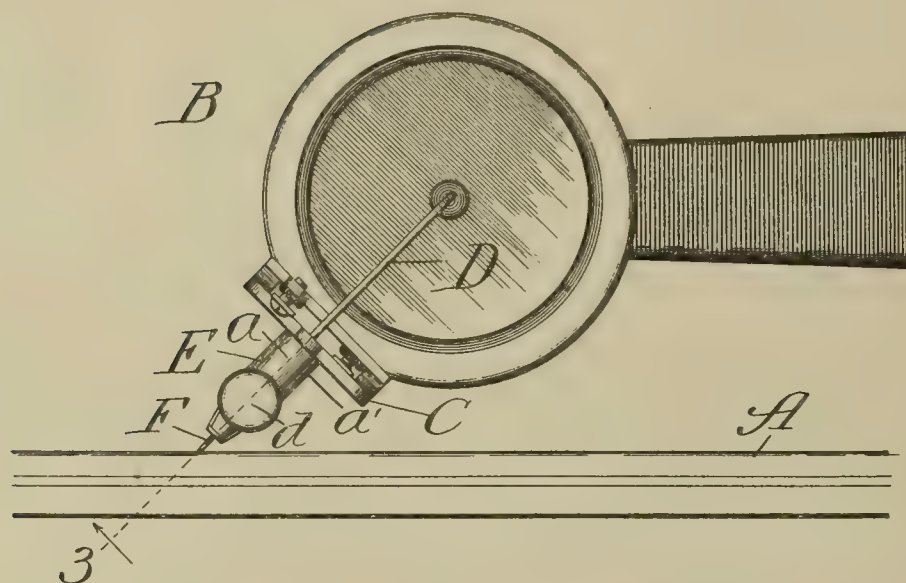


Fig. 2.

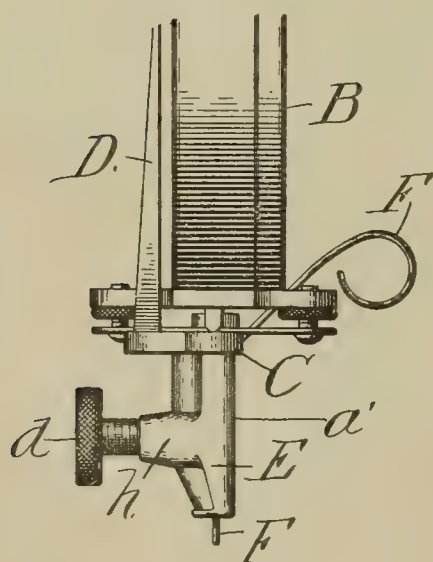


Fig. 3.

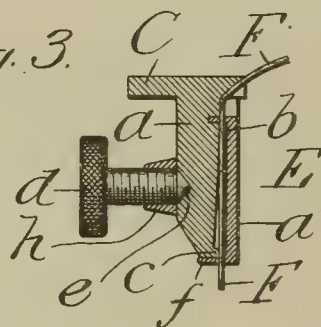
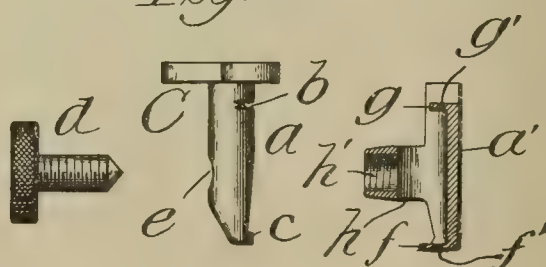


Fig. 4.



Witnesses:
E. E. Fayford,
John Enders.

Inventor:
Herbert S. Mills,
By Pyramforth, Pyramforth & Son,
Attys.

UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

GRAMOPHONE.

No. 812,512.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed May 3, 1905; Serial No. 258,635.

To all whom it may concern:

Be it known that I, HERBERT STEPHEN MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Gramophones, of which the following is a specification.

My invention relates to an improvement in the means for supporting the stylus in the form of an attenuate length of wire on the reproducer of the instrument to cooperate with the rotary record-disk, the degree of attenuation of the wire, which is of uniform or substantially uniform thinness throughout, being such as to cause it to present always to the record-grooves an adequately fine point as it wears away with use by frictional contact with the grooves. This fine wire is too yielding for use without support, since by undue bending in traversing the disk it wears the record and renders it indistinct.

The object of my invention is to provide a novel construction of rigid clamp on the reproducer which shall serve to hold the wire in a manner to permit one end to protrude to the desired short distance beyond the clamp for engagement with the record and to confine the wire throughout the remainder thereof contained in the clamp, so firmly and uniformly as to render it practically an integral part of the rigid clamp, and thus prevent any independent vibration or movement of the wire therein which would tend to mar or destroy the stylus action.

In the accompanying drawings, Figure 1 is a broken view showing in side elevation the reproducer equipped with my improvement and in operative position relative to the record-disk. Fig. 2 is a view of the reproducer in front elevation, shown broken and provided with my improvement. Fig. 3 is a section taken at the line 3 on Fig. 1 viewed in the direction of the arrow and enlarged; and Fig. 4 shows the parts of my improved clamp separated and ready to be assembled, the removable jaw being in section and the other parts in elevation.

A denotes the disk record, and B the reproducer-head, of a gramophone. On the bracket C, which is fastened, as usual, to the edge of the reproducer-head and carries the transmitting contact-finger D, is provided as an integral or permanent part of the bracket one member *a* of a stylus-clamp E. The clamp member *a* is a finger, preferably solid, of substantially cylindrical form, extending parallel

with the finger D, as shown, and provided with a transverse recess *b* in its rear side near the junction with the bracket. On the same side at the outer end of the finger is formed a lip *c* toward which the finger tapers on its face side, and in the last-named side near the tapered end a depression *e* is formed in the clamp-finger to receive the pointed end of a set-screw *d*. The other clamp member, shown at *a'*, is longitudinally channeled on its inner side or is substantially U-shaped in cross-section and tapers toward its forward end, where it terminates in a lip *f*, extending at a right angle to the body of the member, this lip containing a minute perforation or eye *f'*, the rear end of the clamp member *a'* being bifurcated and provided at the base of the bifurcation with a lip *g*, parallel with the lip *f* and containing a minute perforation or eye *g'* in line with the perforation *f'*, and between the ends of this clamp member there extends across its concave side a yoke *h*, provided with a threaded opening *h'*, in which the set-screw *d* works.

The fine wire forming the stylus F is inserted through the eyes *g'* and *f'* of the clamp member *a'*, and the latter is applied to the member *a* in a manner to cause the yoke *h* to surround the latter and introduce the lip *g* into the recess *b* to position the movable member, whereby the lip *f* thereon overlaps the outer face of the lip *c*. The wire is then adjusted to protrude it to the desired extent beyond the lip *f*, when the screw *d* is turned in its bearing to tighten the members *a* and *a'* together and clamp between them the stylus-wire rigidly. With the clamp members thus tightly secured together they grip the wire F so firmly between them as to render it solid with the clamp and preclude the possibility of any movement of the extent of wire between the jaws, while the protruding section thereof permits the point to engage the record-surface. As the protruding wire section, which need not project more than about one thirty-second of an inch beyond the clamp, wears down with use the jaws may be separated by loosening the screw *d* to permit the wire to be drawn out far enough to compensate for the wear, when the jaws will be fastened together again to grip the wire, which may be slightly kinked at the lip *c* if the clamp members are fastened as tightly as possible. The wear is so slight, however, that a single setting of the stylus-wire suffices for use of the point several hundred

times, and the device improves the tone quality of the instrument by rendering it more mellow and softer, the latter quality being particularly desirable in a coin-operated gramophone, for which connection I have more especially devised my improvement.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the reproducer-head of a gramophone, a clamp adapted to hold an attenuate wire forming a stylus, comprising as one member, a finger on said head, and, as the other member, a body, longitudinally channeled on its inner side, fitting about and cooperating with said finger and provided with means for fastening it thereon.

2. In combination with the reproducer-head of a gramophone, a bracket on said head, and a clamp adapted to hold an attenuate wire forming a stylus, comprising, as one member, a finger projecting from said bracket, and, as the other member, a body longitudinally channeled to cooperate with said finger and provided with eyes through which to insert said wire, and with means for fastening the two members together.

3. In combination with the reproducer-head of a gramophone, a bracket on said head, and a clamp adapted to hold an attenuate wire forming a stylus, comprising, as one member, a finger projecting from said bracket and provided on its outer end with a lip, and, as the other member, a body longitudinally channeled to cooperate with said finger and provided with lips containing eyes through which to insert said wire and with means for fastening the two members together.

4. In combination with the reproducer-head of a gramophone, a bracket on said head, and a clamp adapted to hold an attenuate wire forming a stylus, comprising, as one member, a finger projecting from said bracket and provided on its outer end with a lip, and,

as the other member, a body longitudinally channeled to cooperate with said finger and provided with eyes through which to insert said wire and with a yoke forming a bearing containing a set-screw and surrounding said finger to connect therewith the channeled member.

5. In combination with the reproducer-head of a gramophone, a bracket on said head and a clamp adapted to hold an attenuate wire forming a stylus, comprising, as one member, a finger projecting from said bracket and provided with a recess near its inner end and a lip on its outer end, and, as the other member, a body longitudinally channeled to cooperate with said finger and provided with a lip near one end to enter said recess and with a lip on its opposite end to overlap the lip on said finger, the lips on said channeled member containing eyes through which to insert said wire, and means for fastening the two members together.

6. In combination with the reproducer-head of a gramophone, a bracket on said head, and a clamp adapted to hold an attenuate wire forming a stylus, comprising, as one member, a finger projecting from said bracket and provided with a recess near its inner end and a lip on its outer tapered end, and, as the other member, a body bifurcated at one end and longitudinally channeled to cooperate with said finger and provided with a lip near said end to enter said recess and with a lip on its opposite end to overlap the lip on said finger, the lips on said channeled members containing eyes through which to insert said wire, and a yoke forming a bearing containing a set-screw and surrounding said finger to connect the members together.

HERBERT S. MILLS.

In presence of—

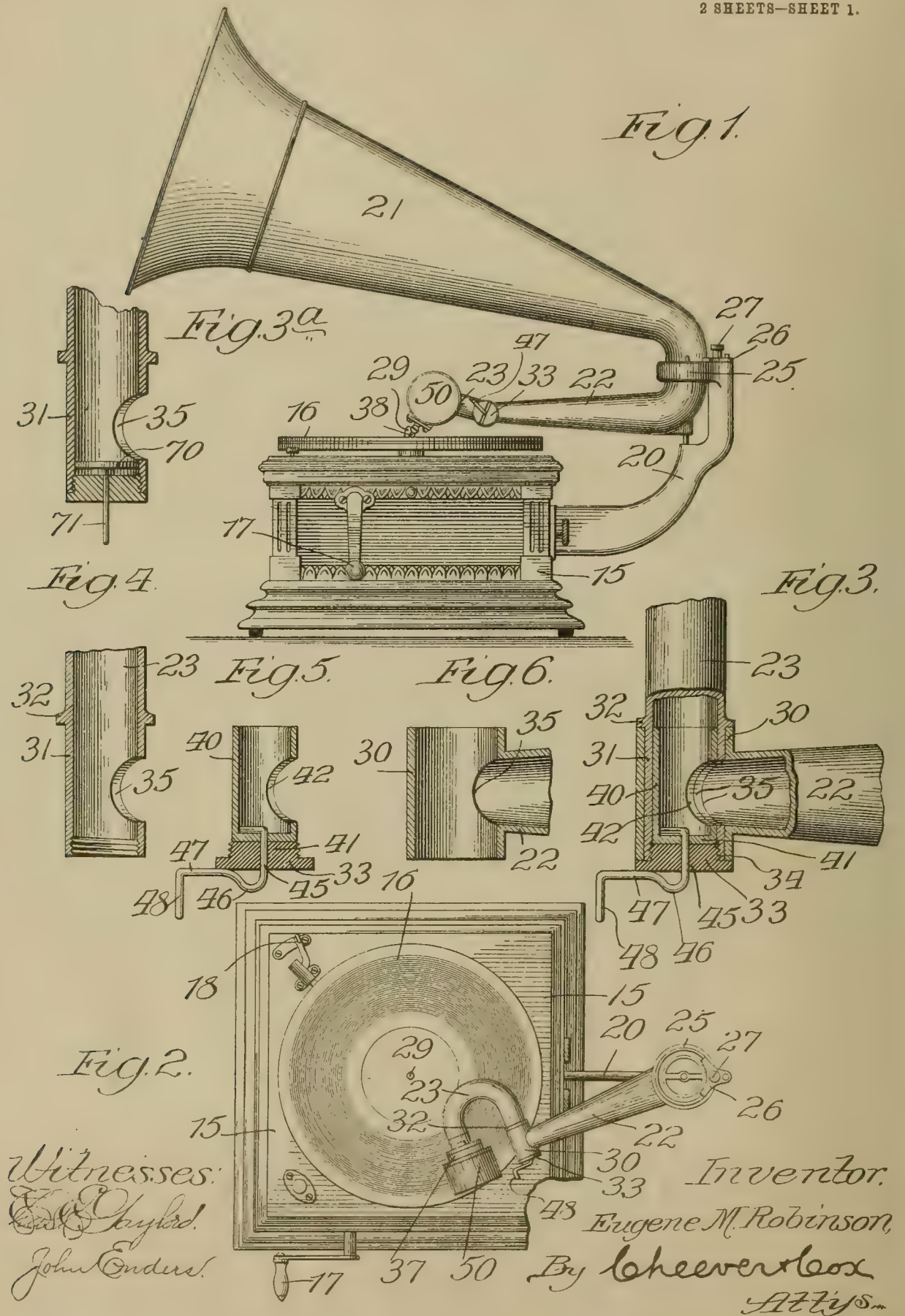
L. HEISLAR,
J. H. LANDES.

E. M. ROBINSON.

PHONOGRAPH.

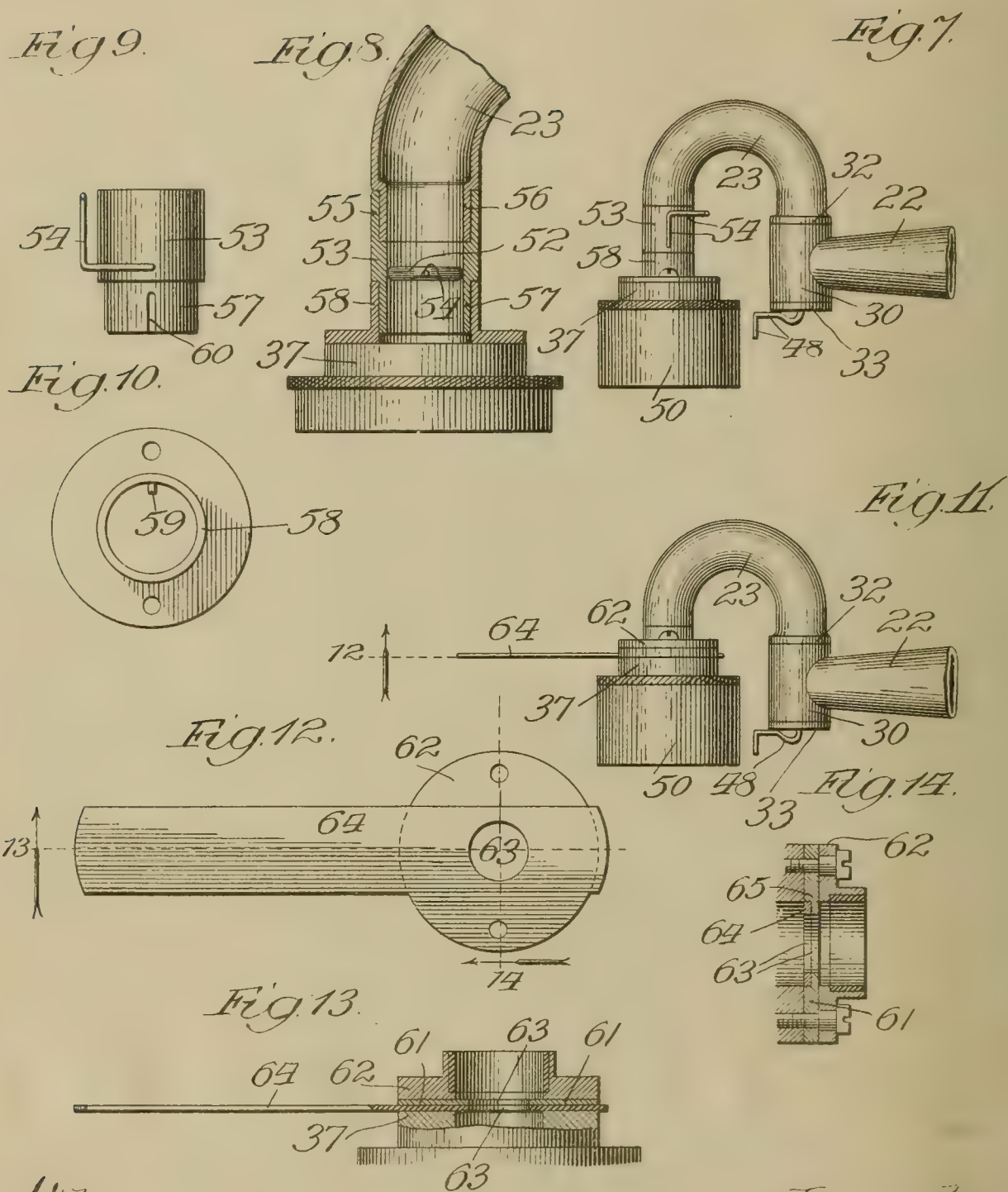
APPLICATION FILED MAR. 22, 1905.

2 SHEETS—SHEET 1.



E. M. ROBINSON.
PHONOGRAPH.
APPLICATION FILED MAR. 22, 1905.

2 SHEETS—SHEET 2.



Witnesses:
E. M. Robinson
John Enders

Inventor:
Eugene M. Robinson,
By Cheever Cox
Att'y

UNITED STATES PATENT OFFICE.

EUGENE M. ROBINSON, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

No. 813,670.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Application filed March 22, 1905. Serial No. 251,470.

To all whom it may concern:

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates to phonographs, and particularly to means for reducing the volume of sound-waves passing through the horn of the phonograph, whereby a phonograph designed for outdoor work or for a large auditorium may be used in a small room without discomfort to the auditors.

My invention is in some respects an improvement upon the device of my prior patent, No. 778,271, for phonograph, issued to me December 27, 1904.

The object of my invention is to provide modified forms of structure for use in place of those shown in my prior patent. One of these forms is especially designed for use in a well-known commercial type of phonograph-horn, whereby I obtain great accuracy of regulation of the volume of sound-waves passing through the horn.

My invention consists in this particular detail in the use of a horn having a substantially right-angled joint therein, there being in one of the angular portions of this horn a rotatable valve adapted to be rotated from without to regulate the volume of sound-waves passing from one of the angular portions of the horn to the other.

The invention also consists in the novel form of mounting for a sound-restricting mechanism, so that it can be detachably placed in the horn at some suitable point between the reproducer and the end of the horn.

My invention further consists in the combination of parts and details of construction which will be hereinafter more fully described and claimed as the specification proceeds.

In the drawings, Figure 1 is a side elevation of one of the commercial forms of phonograph having my preferred form of the invention applied thereto. Fig. 2 is a plan view of the same, a portion of the horn being removed. Fig. 3 is a sectional detail view showing the preferred form of my invention in assembled position. Fig. 3^a shows an alternative form of valve. Figs. 4, 5, and 6 are sectional detail views of different parts of the structure of Fig. 3. Fig. 7 is a plan detail view showing means for restricting at

two different points the volume of sound passing through the horn. Fig. 8 is a sectional detail view of the left-hand arm of Fig. 7, showing in detail a mounting for the restricting mechanism, which mounting can on a proper proportioning of the parts be applied to the horn at any desired point in its length. Fig. 9 is a detail plan view of the exterior of the mounting just referred to. Fig. 10 is a rear view of a reproducer, showing the method of attaching the mounting of Fig. 9 thereto. Fig. 11 is a plan detail view showing two means for restricting the volume of sound passing through the horn at different points, one of said means being practically within the reproducer itself. Fig. 12 is a detail sectional view on line 12 of Fig. 11. Fig. 13 is a sectional plan view taken on line 13 of Fig. 12. Fig. 14 is a sectional detail view taken on line 14 of Fig. 12.

Again referring to the drawings, numeral 15 represents a case of an ordinary phonograph having within it mechanism for rotating an ordinary record 16, said mechanism being wound up by means of a crank-handle 17 and the record being controlled by means of a switch 18.

Extending from one side of the case 15 is a supporting-arm 20, in which the horn is carried. In the commercial form of device here shown the horn is made in three parts—a bell portion 21, a portion 22, and a portion 23. The portion 22 is horizontally rotatably secured to the upper portion 25 of the support 20, and the bell 21 is also rotatably secured in this support 25 in communication with the portion 21, the connections being made by means of a mechanism 26 and 27. (Not shown in detail and not here in question.) The bell of the horn is made rotatable horizontally, so that it may be turned to direct the sound coming from the instrument in different directions, while the portion 22 is made horizontally rotatable, so that the needle-point attached to the reproducer, to be hereinafter described, may travel upon the record from the outside of the record toward its center 29, as is usual in such instruments, or in the opposite direction, if desired. On the smaller end of the portion 22 of the horn and preferably at right angles thereto is an elbow 30. This elbow 30 is usually made, as stated, at a right angle to the portion 22 of the horn; but it may be at any angle convenient, so long as it is distinct enough to allow of the valve 40, to be hereinafter described, work-

ing to close the sound-passage in pipe 22. Journaled in this elbow 30 is a bearing portion 31, forming the end of the portion 23 of the horn. This bearing 31 is restricted in the longitudinal motion within the elbow 30 by a shoulder 32 and is detachably secured within the elbow by the cap 33, engaging the bearing 31 in screw-threads 34. The fit of these parts should be sufficiently accurate so that with only the parts now assembled present sound-waves will pass from the portion 23 through the orifice 35 in the elbow into the portion 22 of the horn and that the U-shaped portion 23 of the horn may be rotated in a vertical plane upon the bearing 21 without sound-waves escaping through the joint. At the opposite end of the U-shaped portion 23 of the horn is secured a commercial reproducer 37, having extending from its lower side a needle 38, engaging the record 16. The device as thus described constitutes one of the commercial forms of phonographs, and I make no claim to it.

In the application of the invention of my prior patent, above referred to, to this machine I mount inside of the bearing end 31 of the U-shaped portions 23 of the horn a tubular valve 40, closed in the portion 41, bearing against the cap 33, heretofore described. This tubular valve 40 has a circular opening 42 cut in one side normally registering with the opening 35, heretofore described, in the bearing 31, the elbow 30, and entering the portion 22 of the horn. To some portion of this tubular valve 40, preferably the end 41, I secure a wire rod or shaft 45, extending through the cap 33 and loosely mounted therein, so that by rotating the shaft or rod 45 the valve 40 may be rotated on its axis inside of the bearing 31. This shaft 45 is after passing through the cap 33 bent around in a loop 46, then downward at right angles to the shaft 45 in line 47, the same preferably bearing slightly against the cap 33, and thus holding the tubular valve 40 in contact with the inside of the cap 33, as shown. On the end of the portion 47 is a handle portion 48, adapted to be taken hold of or touched by the operator. All of the parts shown in Fig. 3 are so proportioned that when the valve 40 is in wide-open position, as in Fig. 3, there is a clear passage away from the portion 23 of the horn into the portion 22 of the horn and that by rotating the handle 48, thereby rotating the valve 40 on its axis, the solid portions of the valve will gradually pass over the opening 35, heretofore described, so that when the valve has been rotated from a quarter to a third of a revolution the passage away from the portion 23 to the portion 22 of the horn will be closed and that except for leakage around the valve 40 sound-waves coming from the reproducer through the portion 22 of the horn are absolutely prevented from passing into

the portion 22 and through the bell 21 of the horn. It will be noted that my valve 40 as thus constructed does not in any way interfere with the rotation of the portion 23 of the horn on its axis in a vertical plane for the purpose of removing the needle 38, for which purpose it is primarily made rotatable in the commercial machines of the type shown and described. In order to make this type of machine most effective, I also place upon the side of the reproducer 37 which is not connected with the horn a cap 50 of the type shown and described in my said prior patent adapted to prevent sound-vibrations escaping into the room from that side of the reproducer. With an instrument thus equipped I can by simply turning the handle 48 fully open, partially open, or wholly close the valve 40, thereby efficiently and accurately regulating the volume of sound passing from the reproducer through the horn, and thus adapting the device for use either in a room where the full capacity of the instrument is desired or to a small room, where only a small portion of such capacity is desired. This is particularly true in the use of band-records upon the phonograph, which with the open horn are usually unpleasantly loud and harsh when the instrument is operated in a small room.

My prior patent above referred to shows and claims means for regulating the volume of sound at two points in the horn between the reproducer and the end of the horn. In Figs. 7 and 8 I have shown two constructions for thus equipping a phonograph of the type here shown. In each case the one at the joint between the portions 22 and 23 in the horn is that just described. In Figs. 7, 8, and 9 I show immediately adjacent to the reproducer a rotatable disk 52, corresponding to that shown in my prior patent mounted in a section of horn-pipe 53, there being a handle 54 outside of the horn by means of which the operator can rotate the disk 52 to different positions to regulate the volume of sound-waves passing through the horn. This section of horn-pipe 53 is made relatively short and has one end enlarged at 55 to fit over the end 56 of the portion 23 of the horn, and it has its other end 57 reduced to fit inside of a projecting ring 58 on the reproducer. The ring 58 on the reproducer is adapted to fit over the end 56 when the pipe-joint 53 is entirely discarded. Consequently by this construction it is possible to use the instrument either with or without the regulating-disk 52, as desired. By changing the size of this pipe joint or section 53 and making proper parts corresponding to 56 and 58 in the other parts of the horn this regulating-disk 52 or other suitable means in pipe-joint 53 may be inserted at any portion of the horn where there is a joint between the reproducer and the extreme outside end of the horn. In order to

insure the valve 52 being in proper position, so that the handle 54 will be in the right position to be taken hold of by the operator, I place a pin 59 upon the inside of the collar 58 of the reproducer adapted to slide in a slot 60 in the portion 57 heretofore described.

It is sometimes inconvenient to use adjacent to the reproducer the connecting mechanism 53 just described, and in such case the mechanism shown in Figs. 11, 12, 13, and 14 can be readily substituted, the same consisting, essentially, of a disk 61, rigidly secured between the reproducer-case 37 and the cap 62, there being an orifice 63 therein, this in combination with a slidable rod 64, adapted to slide backward and forward adjacent to this disk 61 between guides 65 and between the reproducer-case proper, 37, and the cap 62, there being in this slidable member 64 a hole 63, normally registering with the hole 63 in the disk 61 heretofore described. By moving this flat member 64 crosswise of the reproducer, as shown in Fig. 12, the slidable member 64 may be made to partially or wholly close the hole in the disk 61, thereby regulating the volume of sound-waves passing from the reproducer into the horn. This feature of my invention is shown, described, and claimed in (and therefore reserved for) my application, Serial No. 293,985, filed December 30, 1905.

By the use of my preferred form of mechanism first described in combination with either of the alternative mechanisms just described at the different points in the horn I am able to get a wonderfully-accurate regulation of the volume of sound-waves passing through the horn.

In Fig. 3^a I have shown an alternative construction of valve for use in the horn-joint heretofore described. Piston 70 is mounted on piston-rod 71 and adapted to slide along the inside of bearing 31 until it passes opening 35 and shuts off the sound. If desired, the valve 40 may be substituted for this piston 70 and thus moved.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph in combination with a record and reproducer in operative connection therewith; a horn attached to said reproducer having a distinct angle in it between its ends and a valve mounted in one angular portion of the horn adjacent to said angle adapted to be moved to two different positions to close off the admission of sound-waves from one angular portion of the horn to the other portion of the horn adjacent to said angle.

2. In a phonograph in combination with a record and reproducer in operative connection therewith; a horn attached to said reproducer having a distinct angle in it between its ends and a valve mounted in one angular

portion of the horn adjacent to said angle adapted to be rotated on its axis from outside of the horn to close off the admission of sound-waves from one angular portion of the horn to the other portion of the horn adjacent to said angle.

3. In a phonograph in combination with a record and reproducer in operative connection therewith; a horn attached to said reproducer having a distinct angle in it between its ends and a tubular valve mounted in one angular portion of the horn adjacent to said angle adapted to be moved to two different positions to close off the admission of sound-waves from one angular portion of the horn to the other portion of the horn adjacent to said angle.

4. In a phonograph in combination with a record and reproducer in operative connection therewith; a horn attached to said reproducer having a distinct angle in it between its ends and a tubular valve mounted in one angular portion of the horn adjacent to said angle adapted to be rotated on its axis to close off the admission of sound-waves from one angular portion of the horn to the other portion of the horn adjacent to said angle.

5. In a phonograph in combination with a record and a reproducer in operative connection therewith; a horn attached to said reproducer made in two pieces joining each other at a distinct angle, one of said horn-pieces being rotatable with reference to the other at said angle - joint and a valve mounted in the joint connecting the said two portions of the horn adapted to be moved from outside of the horn to regulate the opening connecting the two portions of the horn.

6. In a phonograph in combination with a record and a reproducer in operative connection therewith; a horn attached to said reproducer made in two pieces or portions joining each other at a distinct angle one of the horn portions being rotatable with reference to the other portion and a tubular rotatable valve mounted in the joint connecting the two pieces of the horn adapted to be moved from outside the horn to regulate the opening connecting the two portions of the horn.

7. In a phonograph in combination with a record and a reproducer in operative connection therewith; a horn made in two parts, an elbow on one of said parts to which the other part of the horn is connected and a rotatable tubular valve mounted in said elbow adapted to normally allow sound-waves to pass from one portion of the horn to the other and adapted to be rotated on its axis from outside the horn to close said passage-way.

8. In a phonograph in combination with a record and a reproducer in operative connection therewith; a horn made in two parts, an elbow on one of said parts, a bearing on the end of the other part journaled in said elbow, a cap closing the end of the second horn part

adjacent to said elbow, a crank-handle attached to a shaft extending through said cap and a tubular rotatable valve rigidly mounted on said shaft inside the bearing of the second portion of the horn adapted to normally allow air to pass from one portion of the horn to the other and adapted to be rotated by turning said crank-handle to close said passage-way.

- 10 9. In a phonograph in combination with a record having a reproducer in operative connection therewith a horn made in two parts, an elbow 30 on one of said parts, a bearing 31 on the other of said horn parts, journaled
15 within said elbow 30, a shoulder 32 on the second horn portion bearing against said elbow, a cap 33 also bearing against said elbow and screws threaded into said bearing 31, a rotatable valve 40 journaled inside said bearing 31, a shaft 45 secured to said valve 40
20 passing through the cap 33, a crank-handle 48 connected to said shaft 45 by which said valve may be rotated, the whole being so arranged that in one position sound-waves

from the reproducer may pass from one of 25 said horn portions through the valve into the other portion of the horn and that rotating said valve 40 on its axis first reduces and finally substantially cuts off the passage of sound-waves through the horn all of the parts 30 being shaped, arranged and disposed substantially as shown and described for the purposes set forth.

10. As an article of manufacture for use in mechanism of the class described, a short 35 horn-section 53 having damper mechanism mounted therein, said horn-section being adapted when inserted in a break or cut in the horn to fit over one portion of the horn adjacent to said cut and inside the other horn 40 portion adjacent to said cut as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

EUGENE M. ROBINSON.

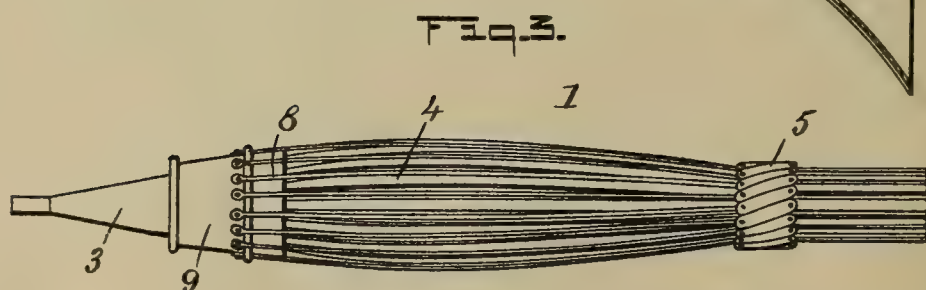
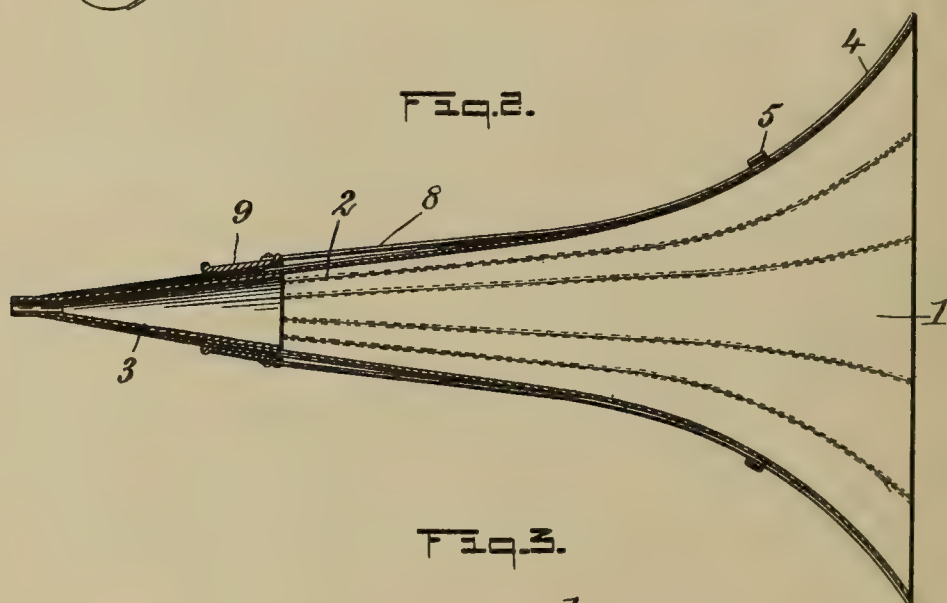
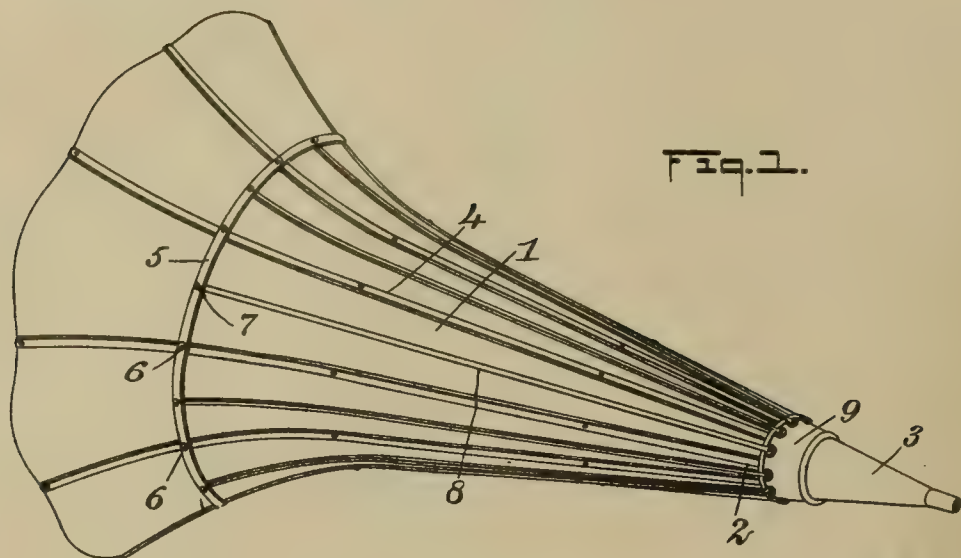
Witnesses:

DWIGHT B. CHEEVER,
HOWARD M. COX.

No. 813,814.

PATENTED FEB. 27, 1906.

M. L. MUNSON.
FOLDING PHONOGRAPHIC HORN.
APPLICATION FILED JULY 13, 1905.



WITNESSES:

H. S. Munson
J. D. Munson

INVENTOR
Martin L. Munson
BY *Munson*
ATTORNEYS

UNITED STATES PATENT OFFICE.

MARTIN L. MUNSON, OF NEW YORK, N. Y.

FOLDING PHONOGRAPHIC HORN.

No. 813,814.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Application filed July 13, 1905. Serial No. 269,486.

To all whom it may concern:

Be it known that I, MARTIN L. MUNSON, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Folding Phonograph-Horn, of which the following is a full, clear, and exact description.

This invention relates to horns such as are attached to phonographs or similar instruments for intensifying sound and throwing it in a desired direction.

The object of the invention is to produce a horn of simple construction which may be folded so as to occupy a small space, enabling the horn to be conveniently carried or packed for transportation.

The invention consists in the construction and combination of parts to be more fully described hereinafter, and definitely set forth in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the horn, representing the same in its opened or expanded condition. Fig. 2 is a longitudinal vertical section of the horn when expanded as in Fig. 1, and Fig. 3 is a side elevation showing the horn in a folded or collapsed condition.

Referring more particularly to the parts, 1 represents the body of the horn, which is preferably composed of leather, cloth, metal, paper, or similar collapsible material. This body has the same general form as usually found in horns of this kind, comprising a contracted neck 2, which attaches to a nipple or mouthpiece 3. As indicated, the mouthpiece 3 is preferably of conical form and should be constructed of metal or similar material. At the inner or large extremity of the mouthpiece a plurality of ribs or stays 4 are attached rigidly, and these stays preferably consist of flat strips or bars of metal, the flat sides whereof are attached longitudinally to the body 1 of the horn. Near their outer extremities these stays 4 are connected by a plurality of links 5, arranged between the stays and pivotally attached thereto at the points 6, as will be readily understood. These links 5 are formed with centrally-disposed joints 7, which joints "break" inwardly or in the direction of the mouthpiece. At the joints 7 pull-rods 8 attach,

and these extend toward the mouthpiece 3 and are attached to a movable ring or collar 9. This collar 9 has preferably the form of a frustum of a cone.

When the links 5 are all straightened out or extended, as indicated in Fig. 1, they operate to maintain the metal frame of the device in its most expanded condition. The construction of the joints 7 is such that when the horn-frame is opened out, as indicated, the horn will maintain itself in this open condition. When it is desired to fold the horn, the ring or collar 9 will be grasped and forced in the direction of the extremity of the mouthpiece. In this way the pull-rods 8 operate upon the links 5 so as to break the joints 7. In this way the outer extremities of the stays or ribs 4 are brought together, and when completely folded the body 1 of the horn will collapse so that the horn will present substantially the appearance shown in Fig. 3. When in this condition, the horn may be very conveniently carried about or packed for shipment and may be readily opened out for immediate use when desired.

It should be observed that the metal parts of the horn when attached together constitute a light framework or frame giving the open horn the required form. It should be understood that when opened out the connected links 5 constitute a jointed ring completely encircling the body of the horn.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A horn of the class described, having a collapsible body, a plurality of stays attached to said body and extending longitudinally thereof, and jointed links connecting said stays and adapted to maintain the same apart.

2. A horn of the class described, having a collapsible body and a mouthpiece attached thereto, a metallic frame attached to said mouthpiece and to said body, said frame comprising jointed links, a collar slidably mounted on said mouthpiece, and rods connecting said links with said collar for actuating said frame.

3. A horn of the class described, having a mouthpiece and a collapsible body, an extensible ring adapted to open said body and means for actuating said ring from a point near said mouthpiece.

4. A horn of the class described, having a mouthpiece and an expansible body, a plu-

ality of links jointed together and pivotally supported on said body to expand the same.

5 5. A horn of the class described, having a collapsible body, jointed links attached to said body and forming an extensible ring, a mouthpiece attached to said body, a sliding collar on said mouthpiece and pull-rods connecting said collar with said links.

In testimony whereof I have signed my name to this specification in the presence of 10 two subscribing witnesses.

MARTIN L. MUNSON.

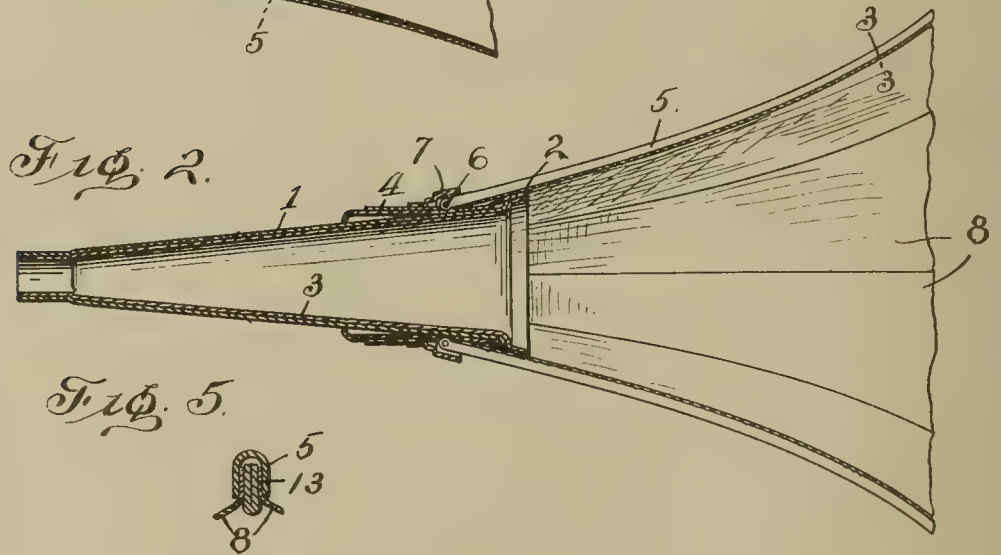
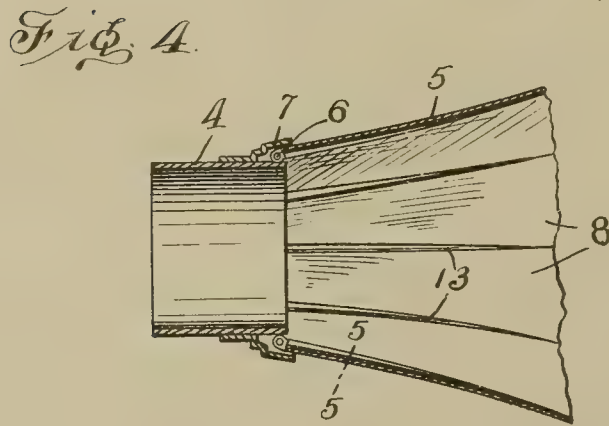
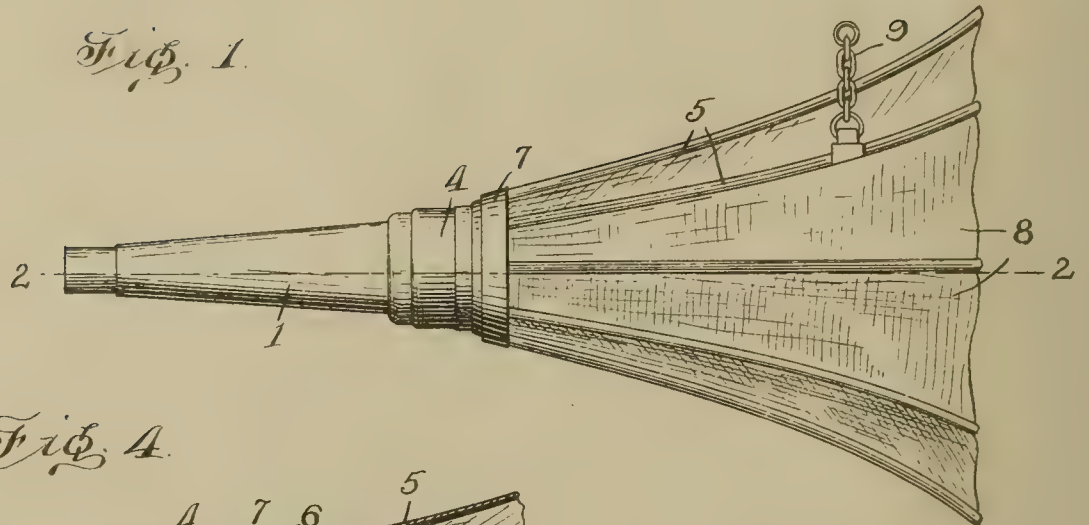
Witnesses:

WILLIAM F. FETT

JOHN CLARK.

J. T. BROWN.
PHONOGRAPH HORN.
APPLICATION FILED JUNE 13, 1905.

2 SHEETS—SHEET 1.



Inventor
James T. Brown

Witnesses
H. G. Robenette
C. L. Horn.

By

G. Ayres
Attorney

J. T. BROWN.
PHONOGRAPH HORN.
APPLICATION FILED JUNE 13, 1905.

2 SHEETS—SHEET 2.

Fig. 8.

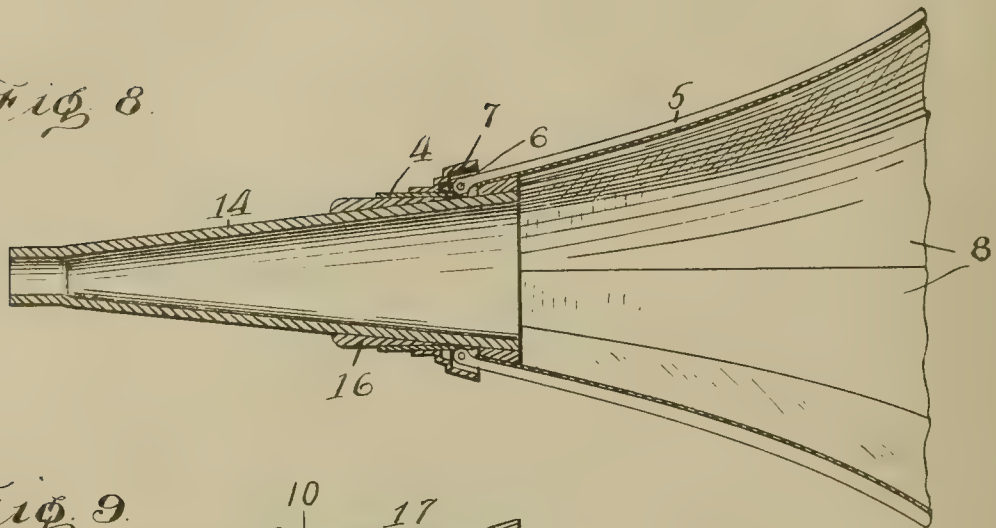


Fig. 9.

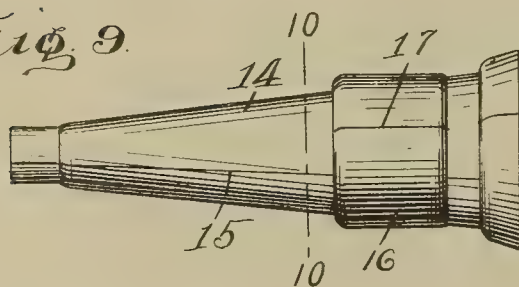


Fig. 6.

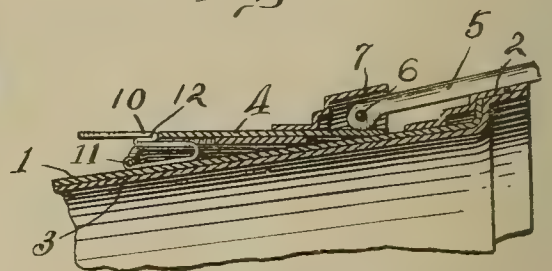


Fig. 10.

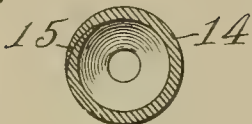


Fig. 7.



James T. Brown ^{Inventor}

Witnesses
H. G. Robinette
C. L. Horn.

By

G. Ayres.

Attorney

UNITED STATES PATENT OFFICE.

JAMES T. BROWN, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 813,999.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Original application filed December 24, 1904, Serial No. 239,241. Divided and this application filed June 13, 1905. Serial No. 265,065.

To all whom it may concern:

Be it known that I, JAMES T. BROWN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

My invention relates to an improved horn especially adapted for use with phonographs or similar devices; and it consists in the constructions, combinations, and arrangements herein described and claimed.

My invention relates especially to the type of collapsible horn described in my pending application, Serial No. 239,241, filed December 24, 1904, of which this is a divisional application.

An object of my invention is to provide a horn which will eliminate the harsh and metallic sounds occurring with existing types of horns when applied to sound-reproducing devices.

A further object of my invention is to provide a simple and compact form of collapsible horn which will be more durable than existing constructions and which can be conveniently adjusted and rigidly held in its expanded position.

Referring to the accompanying drawings, forming a part of this application, and in which similar reference-numerals indicate corresponding parts in the several views, Figure 1 is a side elevation illustrating one embodiment of my invention in its expanded position. Fig. 2 is a sectional view on the line 2 2 of Fig. 1. Fig. 3 is a sectional view, on a larger scale, taken on the line 3 3 of Fig. 2. Fig. 4 is a detail sectional view, on a larger scale, illustrating a modification in which the collapsible portion is provided with interior guard-rails. Fig. 5 is a detail sectional view, on a larger scale, taken on the line 5 5 of Fig. 4. Fig. 6 is a detail sectional view, on an enlarged scale, showing one form of latch for locking together the mouthpiece and collapsible trumpet portion of the horn. Fig. 7 is a side elevation, partly in section, showing the collapsible trumpet portion of the horn in folded position. Fig. 8 is a sectional view illustrating a modification in which the mouthpiece is formed of leather. Fig. 9 is a side elevation of the mouthpiece shown in Fig. 8; and Fig. 10 is a sectional view on the

line 10 10 of Fig. 9, illustrating the manner of joining the leather blank of the mouthpiece.

Referring especially to Figs. 1, 2, 3, 6, and 7 of the drawings, 1 indicates the stiff mouthpiece of a horn, which may be formed of any suitable metal and which is provided with a tapered annular portion 2 for expanding the foldable portion of the horn. The mouthpiece is shown constructed with a closely-fitting lining 3, of leather, throughout its entire inner surface.

The folding portion of the horn comprises a rigid sleeve 4, preferably formed of metal, to which an annular series of stiff ribs 5 are pivoted at 6.

The sleeve 4 is provided with a tapered annular flange 7 for limiting the outward swing of the ribs 5 about their pivots 6, the limiting-flange 7 of the sleeve and the expanding portion 2 of the mouthpiece preferably being constructed with approximately the same taper for securely clamping the ribs 5 tightly therebetween.

As shown especially in Fig. 3, the ribs 5 are constructed of strips of metal bent in U-shaped form for clamping the edges of suitable leather sections 8 therebetween, thereby providing a trumpet-piece, with an inner surface of leather throughout. This construction permits a supporting means, such as a chain 9, to be secured near the outer ends of the ribs for supporting the horn without undue strain.

The mouthpiece 1 carries a suitable latch 10 for securely locking the two portions of the horn together. As shown especially in Fig. 6, this latch may be formed of resilient metal pivoted at 11 to the mouthpiece and provided with a lip 12 for engaging the end of the sleeve 4 when the parts are assembled.

Figs. 4 and 5 illustrate a modified construction, in which guards or guard-rails 13 are clamped between the edges of the flexible leather sections and extend inwardly therefrom in position to be engaged by the expanding tapered portion 2 of the mouthpiece. These rails are for the purpose of preventing the flexible sections 8 from being worn or cut between the expanding portion 2 and the edges of the ribs 5. The rails are preferably formed of metal and are inclined, as shown in Fig. 4.

Figs. 8, 9, and 10 illustrate a modification, in which the body portion 14 of the mouthpiece is formed of a leather blank, which is preferably glued together along a longitudinal lap-joint 15. Such joint could, however, be secured by sewing, riveting, or other well-known means.

A leather band 16 of tapering thickness is glued or secured about the body portion 14 in position to provide a cylindrical seat for the sleeve 4 of the folding portion. This band is shown glued together along a longitudinal lap-joint 17, which is arranged out of registry with the joint 15 of the body portion.

In all sound-reproducing machines as at present constructed there are produced typical harsh and metallic sounds, which are very noticeable and objectionable. Many unsuccessful experiments have been made for eliminating this recognized defect by changes in construction of the records, diaphragms, and horns.

I have discovered that a horn provided with an inner surface of leather throughout will entirely eliminate the objectionable harsh and metallic sounds without decreasing the volume of sound produced. My invention provides such a construction in a convenient and inexpensive form, and it has proven highly efficient in use with various types of sound-reproducing devices.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn comprising a mouthpiece and a collapsible portion constructed with their inner surfaces of leather, said collapsible portion arranged to be expanded by engagement with said mouthpiece, and guards for protecting the leather inner surfaces during such engagement, substantially as described.

2. A horn comprising a mouthpiece and a collapsible portion constructed with their inner surfaces of leather, said collapsible portion arranged to be expanded and clamped in expanded position by engagement with said mouthpiece, and guards for protecting

the leather inner surfaces during such engagement, substantially as described.

3. A horn comprising a mouthpiece and a collapsible portion constructed with their inner surfaces of leather, said mouthpiece arranged to telescope within the collapsible portion for expanding the latter, and guards for protecting the inner surfaces during such expansion, substantially as described.

4. A horn comprising a mouthpiece, a collapsible portion, said mouthpiece and collapsible portion constructed with their inner surfaces of leather, means carried by said mouthpiece for expanding the collapsible portion, and guard-rails carried by said collapsible portion in position for engagement by said expanding means, substantially as described.

5. A horn comprising a mouthpiece, a collapsible portion, said mouthpiece and collapsible portion constructed with their inner surfaces of leather, means carried by said mouthpiece for expanding the collapsible portion, and inclined guard-rails carried by said collapsible portion in position for engagement by said expanding means, substantially as described.

6. A horn comprising a mouthpiece, a collapsible portion, means carried by said mouthpiece for expanding the collapsible portion, and rails carried by said collapsible portion in position for engagement by said expanding means, substantially as described.

7. A horn comprising a mouthpiece, a collapsible portion, tapered means carried by said mouthpiece for expanding the collapsible portion, and inclined rails carried by said collapsible portion in position for engagement by said expanding means, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES T. BROWN.

Witnesses:

FRANK CAPEK,
LILLIAS H. SHERMAN.

No. 814,053.

PATENTED MAR. 6, 1906.

R. KLEIN.
DISK TALKING MACHINE BLANK.
APPLICATION FILED MAR. 19, 1904.

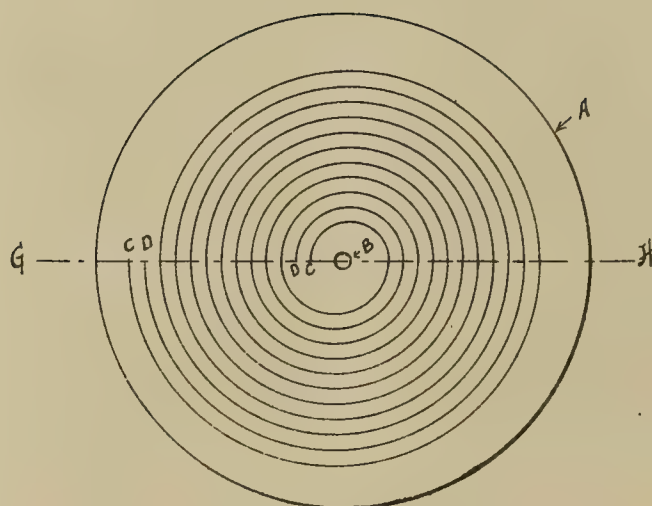


Fig. 1



Fig. 2.

WITNESSES:

Samuel P. Reed
R. H. Bigeltinger

Rudolph Klein
INVENTOR.

UNITED STATES PATENT OFFICE.

RUDOLPH KLEIN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-FIFTH TO
BYRON G. HARLAN, OF ORANGE, NEW JERSEY.

DISK-TALKING-MACHINE BLANK.

No. 814,053.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed March 19, 1904. Serial No. 198,909.

To all whom it may concern:

Be it known that I, RUDOLPH KLEIN, a citizen of the United States, residing at New York city, county and State of New York, have invented a new and useful Improvement in Disk-Talking-Machine Blanks, of which the following is a specification.

The object of my invention is to provide a ready means of producing disk-talking-machine records of a wax composition or the like in such a manner as to enable said records to be utilized in connection with the usual apparatus employed for reproducing the permanent records of trade and at the same time protect such records from accidental injury through being scratched or rubbed together. My device also secures the ready tracking of the recording-stylus in making said sound-records on my improved blanks, resulting in the sound-record being made in the form of a volute spiral on the disk. I attain these objects by the means illustrated in the accompanying drawings, which form part of this specification, and in which—

Figure 1 shows a top or plan view of one form of my improved device. Fig. 2 shows a cross-section on line G H of Fig. 1.

Fig. 1 shows a disk A with two volute spirals C and D thereon parallel with each other, one of said spirals C being filled with

a wax composition or the like. Same figure, B shows a hole in center of said plate or disk.

The operation or use of my improved disk is as follows: The disk A, Fig. 1, is placed on the turn-table of what is known as a "disk talking-machine," and the stylus of the recording device is placed upon the volute curve C, while an arm, carrying a pointed end bent down into the parallel spiral or volute D, aids in keeping the recording device true in track C.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a disk-blank for talking-machines, a rigid disk with multiple parallel volute spirals thereon, one of which spirals shall have therein a wax-like-record composition or material.

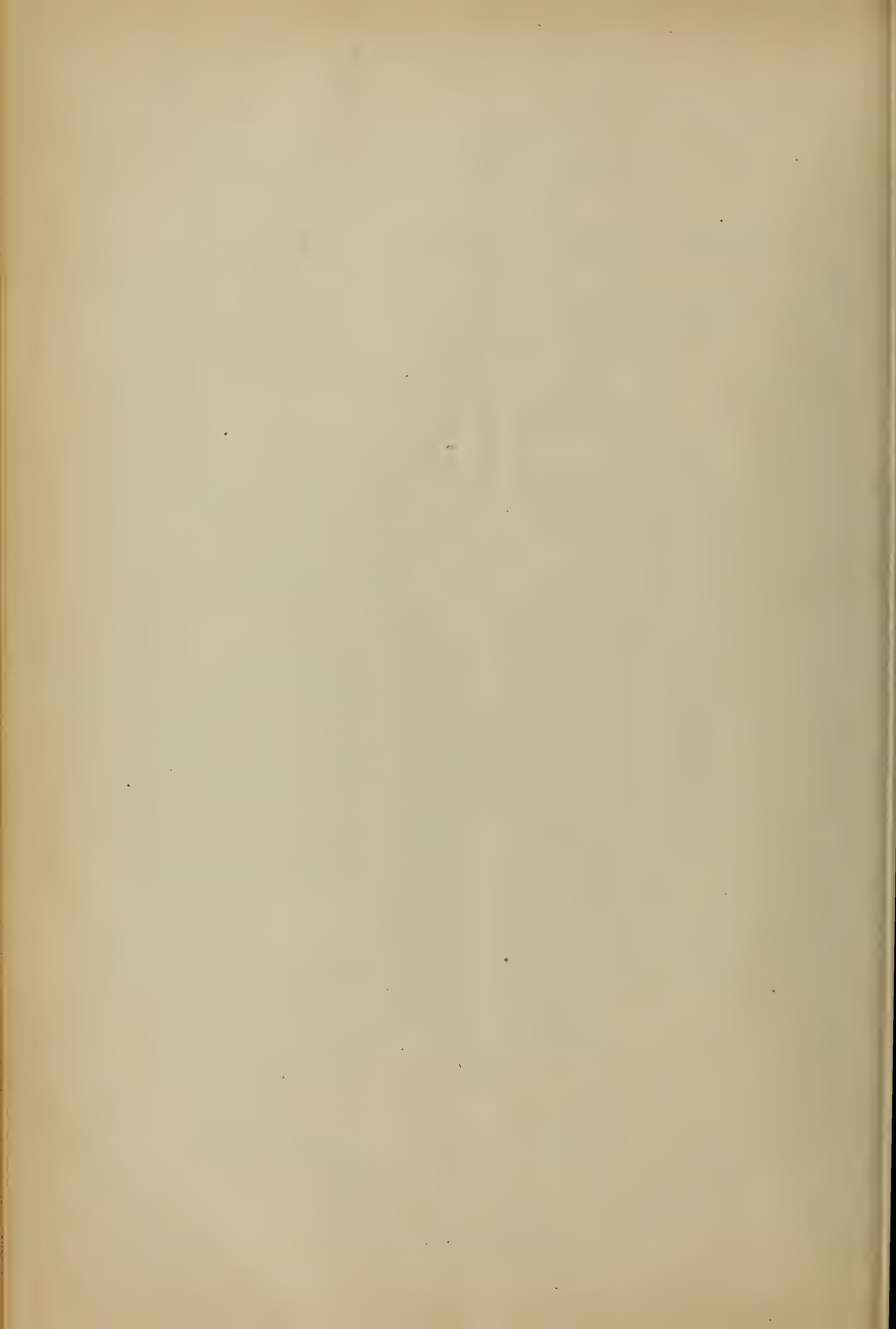
2. In a disk-blank for talking-machines, a rigid disk with multiple parallel volute spirals thereon, all but one of said volute spirals having therein a wax-like composition or record material.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of March, 1904.

RUDOLPH KLEIN.

Witnesses:

L. W. AIGELTINGER,
SAMUEL J. REED.



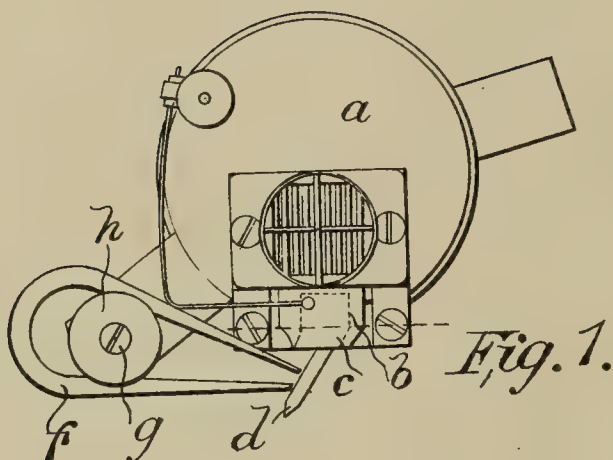
No. 814,561.

PATENTED MAR. 6, 1906.

C. A. PARSONS.

GRAMOPHONE.

APPLICATION FILED SEPT. 26, 1904.



Attest:

Wm. M. Mason
Edward Sartou

Inventor.
Charles A. Parsons.

By *Wm. M. Mason, Donaldson & Pearson*

Attys

UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS, OF NEWCASTLE-UPON-TYNE, ENGLAND.

GRAMOPHONE.

No. 814,561.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed September 26, 1904. Serial No. 225,978.

To all whom it may concern:

Be it known that I, CHARLES ALGERNON PARSONS, a subject of the King of Great Britain and Ireland, residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented new and useful Improvements in Gramophones, of which the following is a specification.

The invention consists in the features, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 shows an elevation of a gramophone-reproducer with one form of my improved attachment, Fig. 2 being a sectional plan of the socket.

The reproducer is shown at *a*. The weigh bar or lever *b* carries a valve which takes the place of the reproducing-diaphragm of the ordinary gramophone, and the arm *c*, in one piece with said weigh bar or lever *b*, forms the style-holding socket. The reproducer is attached to a pivoted arm and is supported by its needle resting on the record in the usual manner. A diamond-section hole *e* for the reception of the needle *d* is formed in the socket *c* by means of a drift or by drilling a round hole and upsetting the material of the socket upon a drift or mandrel, the longer axis of the diamond-section hole being disposed approximately in a plane perpendicular to the record and tangential to the lines of the record. The depth of the hole is made from a quarter to one-half the length of the needle, and the dimensions of the hole are so arranged that the pressure of the record causes the needle-stem to jam in the acute angles of the diamond-shaped hole on an oblique position, as shown in Fig. 1. In order to retain the needle in position while the reproducer is not resting on the record, I provide a small permanent magnet *f*, which is attached to the reproducer with its poles sufficiently near the needle-stem to retain the needle in its slanting position. The magnet *f* is preferably attached by a nut and bolt *g*, being adjustably held between a washer *h* and the face of the reproducer.

The socket-arm *c* is made of magnolium, aluminium, or some other non-magnetic material; but in some cases I may make it of steel and transmit the necessary retaining magnetism through it.

Instead of holding the needle in place magnetically when off the record, as above described, I may use the same form of needle-socket and diamond-shaped hole therein, and I may provide a very light spring-blade, preferably attached to the socket-arm *c* and sunk in a recess in said arm, the spring-blade being formed with a rounded end, which presses lightly on the needle and prevents the same from falling out. The pressure of the spring on the needle is not sufficiently great to interfere with the rigid grip of the socket on the needle.

It will be seen that in both the forms of my invention above described the needle is held absolutely without freedom in a direction perpendicular to the longer axis of the diamond-shaped hole, but can be very readily taken out when desired.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A needle attachment for gramophones and the like, comprising, a socket-arm attached to the sound-producing means, said socket-arm having a diamond-shaped socket therein adapted to receive a needle, and hold the same jammed with no lateral freedom when resting on the record and means external to said socket acting on the portion of the needle which projects therefrom for holding the needle in the socket, substantially as described.

2. A needle attachment for gramophones and the like, comprising a socket-arm having a socket for the needle, and a magnet external to said socket and acting on the projecting portion of the needle, substantially as described.

3. A needle attachment for gramophones and the like, comprising a socket-arm attached to the sound-producing means, said socket-arm having a diamond-shaped hole therein adapted to receive a needle, and hold

the same jammed with no lateral freedom when resting on the record, and an adjustably-mounted magnet adapted to retain the needle in place when not resting on the record, as set forth.

5 4. A needle attachment for gramophones and the like, comprising a socket-arm having a socket for the needle, a magnet arranged independent of the socket and socket-arm

and acting on the projecting portion of the needle, substantially as described. 10

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES ALGERNON PARSONS.

Witnesses:

HENRY GRAHAM DAKYNS, Jr.,
WILLIAM MENZIES JOHNSTON.

E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED FEB. 12, 1903.

Fig 1.

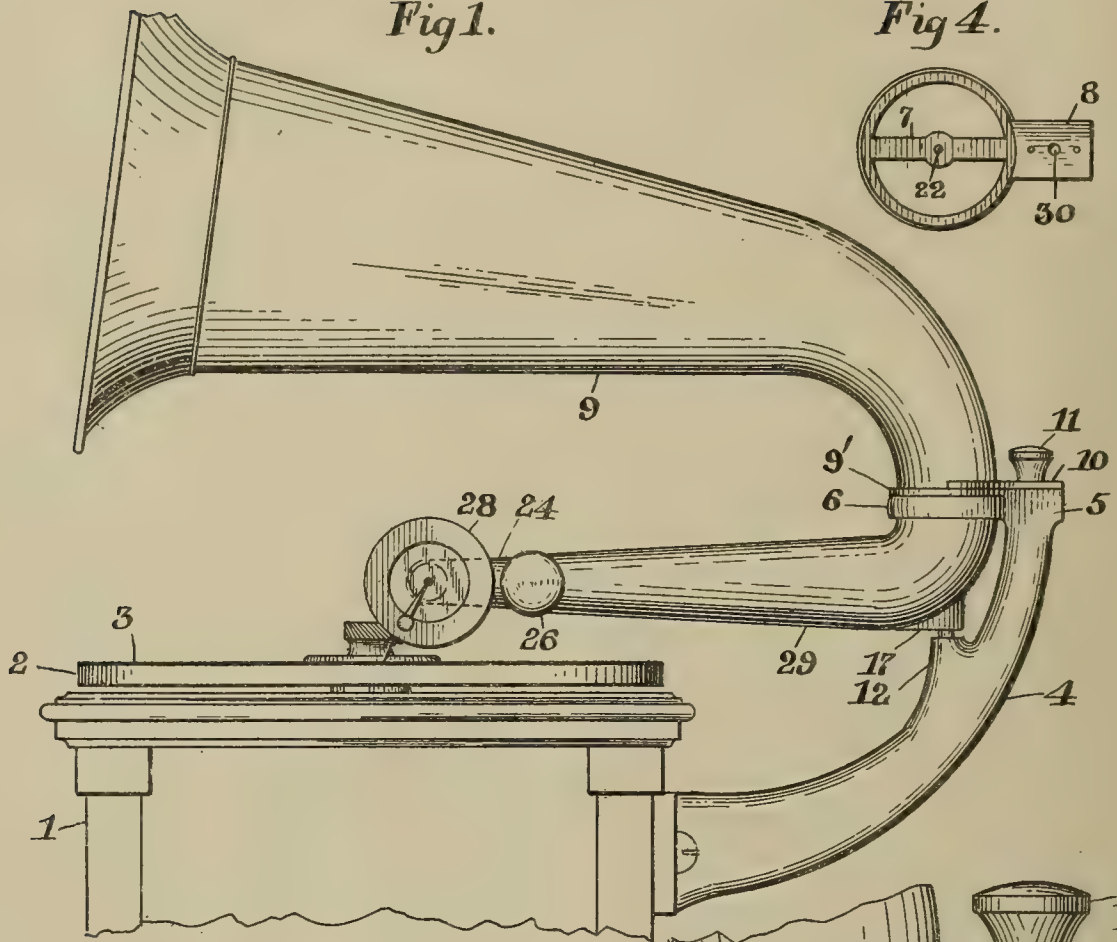


Fig 4.

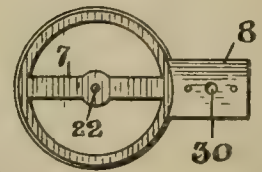


Fig 2.

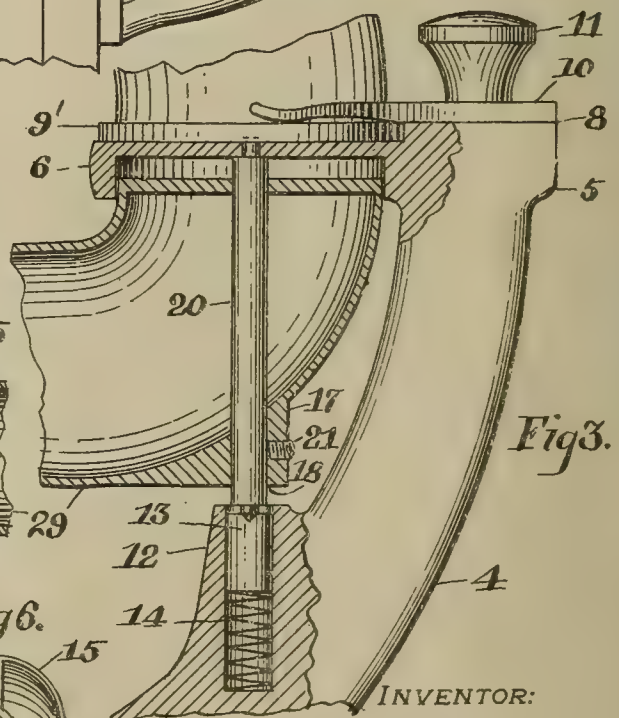
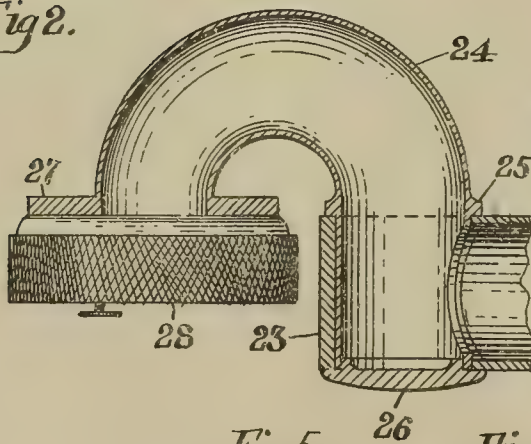


Fig 3.

Fig 5.

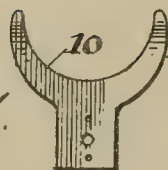
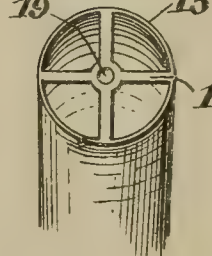


Fig 6.



WITNESSES:

Edw. W. Vaill Jr.
Chas. B. Smith.

INVENTOR:

Eldridge R. Johnson

by *John R. Johnson*
ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

TALKING-MACHINE.

No. 814,786.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed February 12, 1903. Serial No. 143,060.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful
5 Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

In a talking-machine where an amplifying-horn is employed for delivering the reproduced sounds it is desirable and advantageous in obtaining the highest degree of efficiency in the quality and volume of the tone reproduced to employ not only a large horn, but also to locate the small end of the horn as
15 near as possible to the sound-box or reproducing mechanism. By locating the small end of the horn in this manner so that the sound-conducting tube or horn flares outwardly practically from the sound-box I have
20 found that it allows the sound-waves to advance with a regular, steady, and natural increase in their wave fronts in a manner somewhat similar to that of the ordinary musical instruments, thus obviating the well-known
25 disadvantages due to long passages of small and practically constant diameter. It is also desirable to avoid abrupt turns in the sound-conducting tube or passage.

It is therefore the object of my invention to
30 provide a talking-machine with an amplifying-horn meeting these requirements and at the same time to reduce the size, length, and weight of the horn, so that it can be conveniently transported.

35 Other objects of my invention will appear in the specification in connection with the accompanying drawings, forming a part thereof, which show a preferred form of apparatus embodying my invention.

40 In said drawings, Figure 1 is a side elevation of my improved construction as applied to the talking-machine; Fig. 2, a horizontal sectional view of the small end or hollow arm portion of the amplifying-horn, showing the
45 means to allow of the vertical movement of the sound-box; Fig. 3, a vertical sectional view showing the means whereby the larger portion of the horn is adjustably mounted and the hollow arm or lower portion of the
50 horn is pivoted so as to communicate therewith; Fig. 4, a plan view of the end of the support for the larger portion of the amplifying-horn; Fig. 5, a view of the yoke for holding the same in position upon its support, and

Fig. 6 a plan view of the end of the hollow
arm or pivoted portion of the amplifying-horn. 55

The numeral 1 indicates the usual motor-casing, above which revolves the usual turn-
table 2 and upon which is carried the sound- 60
record 3. At one side of the casing 1 a bracket or arm 4 is provided which is similar in shape to those already in use excepting its upper
end portion. This upper end portion 5 consists of a ring 6, having a bar 7 across one di- 65
ameter thereof. The bell portion 9 of amplifying-horn is provided at its end with a flange 9', which is adapted to be seated upon the ring 6 of the support 4. The upper end
70 of the support 5 is provided with a flat portion 8, having a screw-hole 30 therein. Upon this flat portion a yoke 10 is adapted to be fixed by the thumb-screw 11. The arms of this yoke 10 project over the ring 6 and are adapted to press upon the flange 9 of the bell 75
portion of the amplifying-horn, and thereby retain said portion in position. It will be noticed that this construction enables the bell portion of the horn to be directed at any angle horizontally to send the sound to any 80
point which choice or convenience may require. The arms of the yoke 10 are slightly curved and are made of spring material, so that the bell portion of the horn may be easily placed in position and removed. 85

Upon the arm 4 a boss or projection 12 is provided which is recessed internally to provide a socket for a bearing-block 13, which is forced upwardly by a coiled spring 14. The horizontally-pivoted hollow arm portion 29 90
of the amplifying-horn is curved upwardly and terminates in a ring 15, having spider-arm 16 across two diameters thereof. Upon the elbow or curve of the horizontally-pivoted arm of the horn is provided a boss 17, having 95
a hole 18 therein which corresponds with a hole 19 in the spider at the end of said curved portion. A vertical pivot pin or bar 20 passes through these holes or openings and is retained in position by the set-screw 21. The 100
lower end of this pivot-bar 20 has a bearing in the spring-pressed block 13, and its upper end enters the bearing 22 in the bar 7 of the support 4. The parts are of such a size and are so adjusted that the upper end of the piv- 105
oted arm of the horn will enter the ring 6 for a short distance; but sufficient space is left between said parts to allow said arm to swing

freely and yet to provide a practically sound-tight joint.

The joint for allowing a vertical movement to the sound-box is constructed as follows:

5 The inner or smaller end of the horizontally-pivoted hollow-arm portion 29 of the amplifying-horn is provided with a strap or ring 23, which is adapted to receive and form a bearing or socket for the end of a semicircular piece of tubing 24. The end of this piece of tubing 24 is held in position by suitable flange 25 and by a cap 26, which also serves to close the outer end thereof. To the other end of the curved tubing 24 is attached a plate 27, which carries the usual sound-box 28. It will be seen that by this construction the sound-box is brought practically into alinement with the end of the horizontally-pivoted hollow-arm portion of the horn, and is therefore on a radius from the axis of the pivot-bar 20.

From the foregoing description it is seen in the first place that I provide, in effect, an amplifying-horn that extends practically from the sound-box and that it consists of two sections, one of which is the tapering hollow sound-conducting arm permanently mounted upon the machine, while the other section is removable horn proper. The advantage of this is that I secure the requisite length of a constantly flaring or tapering horn, which gives the desired result in the quality and volume of the reproduction, while at the same time the size and weight of the removable horn is materially reduced, so as to be far more convenient in transportation, as it is understood that in transporting the machine the horn is usually removed therefrom and carried separately; but with my invention it is noted that the horn proper forms only a portion of the tapering sound-conducting tube, and thus it is far more convenient and less cumbersome to carry. The other advantage is that the weight imposed upon the stylus and the record is greatly reduced, since the horn is supported entirely by the bracket 4, while it retains all the advantages in that it is capable of being turned in any direction independent of the sound-tube 29, and this sound-tube 29 is supported so that it is capable only of a movement parallel with the face of the record, being free to swing horizontally and unconstrained and unrestrained when swinging in this direction except by the operative contact of the stylus in the sound-grooves of the record-tablet, and the horizontal movement of this sound-tube 29 is also substantially uninfluenced by its own weight and that of the sound-box carried thereby, and it is further to be noted that I have avoided to the greatest degree any abrupt turns, while the sound-box is movable freely toward and away from the record independently of the sound-tube 29 and is unconstrained mechanically in its movement to-

ward and away from the record, resting by its own weight when reproducing and being capable of being lifted and moved and turned on its pivotal support to an inoperative position, resting upon said sound-tube 29. In fact, I have produced, in effect, a sectional horn tapering from end to end, the large section of which is movable independently of the smaller section, which latter is capable of moving only in a plane parallel with the record-tablet and by means of the operative contact of the stylus in the record-groove. I thus secure all the advantages of the large size removable horn with the further advantage that the horn is materially reduced in size and weight, and I secure the further advantage due to the use of a hollow arm, which moves only in a plane practically parallel with the face of the record and upon the end of which is carried the sound-box movable independently thereof toward and away from the record, which overcomes imposing upon the record and reproducing-stylus the weight of the horn and conducting tubes or passages, while at the same time obviating the movement of a large removable horn. Another and important advantage is that by utilizing the tapering sound-tube 29 as a portion of the amplifying-horn and in thus reducing the length of the horn supported by the bracket I greatly reduce the size of the machine, for I am enabled to secure the same result as to quality and volume in reproduction and at the same time greatly reduce the length of horn projecting from the bracket or arm 4.

In employing in the claims the terms "parallel" and "horizontal" it will be understood that such terms are used to express the general relation of the parts referred to and their movement and relation in a general way, and when such parts are used in their ordinary manner and although theoretically perhaps there might not be always a strictly parallel or horizontal relation or condition it would be so to all intents and purposes.

The means for supporting the bell portion 9 of the horn also provides a firm support therefor and are placed at a point in the horn where the same is not so small as to require special means for strengthening its supporting portion.

Changes in details may be made without departing from the spirit and scope of my invention; but,

Having described the nature of the invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a talking-machine, an amplifying-horn proper, a record-support, a tapering sound-tube movable independent of the amplifying-horn proper and communicating therewith, a sound-box mounted upon and communicating with the small end of said sound-tube and movable independently of said sound-tube toward and away from the

record-support and supporting means at the communicating portions of the horn and tube.

2. In a talking-machine, an amplifying-horn proper, a record-support, a tapering sound-tube movable independent of the amplifying-horn proper and supported to move in a given plane parallel with said record-support, a sound-box mounted upon and communicating with the small end of said tube and movable independently thereof toward and away from the record-support, said horn and tube communicating, and supporting means at the communicating portion of said horn and tube.

3. In a talking-machine, an amplifying-horn proper, a record-support, a tapering sound-tube supported in a given plane parallel therewith, and having its large end coupled with the small end of said horn, said tube being movable independent of the amplifying-horn proper, and a sound-box mounted upon and communicating with the small end of said tube and movable independently thereof toward and away from the record-support.

4. In a talking-machine, a record-support, a tapering sound-tube, a sound-box mounted upon and communicating with the small end thereof and movable independently of said tube toward and away from the record-support, and a tapering horn having its small end coupled with the large end of said tube, said horn and tube being relatively movable.

5. In a talking-machine, a record-support, a tapering sound-tube, a sound-box mounted upon and communicating with the small end thereof and movable independently of said tube toward and away from the record-support, and a removable tapering horn having its small end coupled with the large end of said tube, said horn and tube being relatively movable.

6. In a talking-machine, a record-support, a tapering sound-tube, a sound-box mounted upon and communicating with the small end thereof, and movable independently of said tube toward and away from the record-support, and a horn having its small end coupled with the large end of said tube, said horn and tube being independently supported.

7. In a talking-machine, a record-support, a tapering sound-tube supported in a given plane parallel therewith, a sound-box mounted upon and communicating with the small end of said tube and movable independently thereof toward and away from the record-support, and a horn having its small end coupled with the large end of said tube, said horn being independently supported and movable transversely independently of said tube.

8. In a talking-machine, a sound-tube and communicating sound-box, a removable horn having its small end communicating with said sound-tube, a support for said horn, said

horn being movable relative to said tube, a lateral projection or shoulder at the small end of said horn, and means for engaging said shoulder for holding said horn in position upon its support.

9. In a talking-machine, a tapering sound-tube and sound-box communicating therewith, a horn having its small end deflected laterally and communicating with the large end of said tube, said horn being movable only in a horizontal plane.

10. In a talking-machine, a tapering sound-tube and sound-box communicating therewith, the large end of said sound-tube being deflected laterally at its point of support, and a horn having its small end deflected laterally and communicating with the large end of said tube, said horn and tube being supported to move in given horizontal planes.

11. In a talking-machine, a tapering sound-tube and sound-box communicating therewith, a support therefor, the large end of said sound-tube being deflected laterally at its point of support, and a horn having its small end deflected laterally and communicating with the large end of said tube, said horn and tube being independently supported and relatively movable in given horizontal planes.

12. In a talking-machine, a tapering sound-tube and sound-box communicating therewith, a support therefor, the large end of said sound-tube being deflected laterally at its point of support, and a horn having its small end deflected laterally and communicating with the large end of said tube, said horn and tube being independently supported and relatively movable in given horizontal planes and the support for the horn serving as a coupling for uniting the horn and tube.

13. In a talking-machine, a sound-tube supported in a given horizontal plane and having a movable small transverse end section extending laterally therefrom, and a sound-box mounted upon and communicating with said section.

14. In a talking-machine, a sound-tube having a movable end section extending laterally therefrom, and a sound-box mounted upon and communicating with said section, said section being adapted to rest upon and be supported by said tube in an inoperative position.

15. In a talking-machine, a sound-tube, a movable end section extending laterally therefrom and comprising a plurality of limbs, and a sound-box mounted upon and communicating with the outer limb, said section being adapted to rest upon and be supported upon said tube in an inoperative position.

16. In a talking-machine, a sound-tube having a semicircular section movably

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mounted upon the end thereof, to move independently of the sound-tube during its operative movement, and a sound-box mounted upon and communicating with the outer limb of said section.

17. In a talking-machine, a sound-tube having a transversely-extending tubular bearing portion, a tubular section movably mounted therein to move independently of the sound-tube, during its operative movement, and a sound-box mounted upon and communicating with said section.

18. In a talking-machine, a sound-tube having a movable end section, a sound-box mounted upon and communicating with said section, said tube being located in the path of said movable end section, whereby the latter is adapted to be supported upon said arm to hold the sound-box in an inoperative position.

19. In a talking-machine, a sound-tube having a movable bent end section extending laterally therefrom, and a sound-box mounted upon and communicating with said section, said tube being located in the path of said movable end section, whereby the sound-box is adapted to be supported by said tube in an inoperative position.

20. In a talking-machine, a record-support, a tapering sound-tube, a horn having its small end communicating with the large end of said tube, the communicating ends of said tube and horn being deflected laterally toward each other, said horn and tube being supported at their deflected portions to move in a given plane parallel with the record-support, and a sound-box mounted upon and communicating with the small end of said tube and movable independently thereof toward and away from the record-support.

21. In a talking-machine, a record-support, a tapering sound-tube having a laterally-deflected large end, said tube being supported at its deflected portion to move in a given plane parallel with the record-support, a sound-box mounted upon and communicating with the small end of said tube and movable independently thereof toward and away from the record-support, and a horn having its small end laterally deflected and communicating with the deflected large end of said tube.

22. In a sound recording or reproducing mechanism, a hollow tapering sound-conducting arm, a record-support, said arm being vertically pivoted at its larger end to constrain its smaller end to move in a given plane parallel with the face of the record-support, a sound-box mounted upon the smaller end of said arm and having communication therewith, and means to allow a movement of the sound-box toward and from the record-support independently of the hollow arm.

23. In a sound recording or reproducing

mechanism, a hollow tapering sound-conducting arm, a vertical pivot at its larger end which constrains said arm to move in a given plane parallel with the face of the record, a sound-box mounted upon the smaller end of said arm and a bent pivoted tube connecting said arm and said sound-box to allow a movement of the sound-box toward and from the record independently of the hollow arm and to carry said sound-box in substantial alinement with the tapering portion of said arm.

24. In a sound recording or reproducing mechanism, a hollow tapering sound-conducting arm, a vertical pivot at its larger end which constrains said arm to move in a given plane parallel with the face of the record, a sound-box mounted upon the smaller end of said arm and a semicircular pivoted tube connecting said arm and said sound-box to allow a movement of the sound-box toward and from the record independently of the hollow arm and to carry said sound-box in substantial alinement with the tapering portion of said arm.

25. In a sound recording or reproducing mechanism, a horizontally-pivoted tapering hollow arm, a curved portion mounted at the end of said horizontally-pivoted portion and adapted to swing vertically, a sound-box mounted on the end of said curved portion, an adjustable flanged horn communicating with the pivoted end of said horizontally-pivoted arm, a ring adapted to receive the flange of said horn and means for securing the flange upon said ring.

26. In a sound recording and reproducing mechanism, a horizontally-pivoted tapering arm, a strap or ring at the smaller end thereof, a semicircular portion, the end of which is mounted to turn in said strap or ring, a sound-box mounted at the outer end of said semicircular portion, a support for the pivot of said horizontally-pivoted arm and a fixed adjustable horn carried by said support.

27. In a sound recording and reproducing mechanism, a horizontally-pivoted tapering arm, a curved tapering portion joined to said horizontally-pivoted arm, a sound-box carried by said curved portion, a pivot-pin for said horizontal arm, a supporting-arm for said pivot-pin, a spring-pressed block forming a bearing for said pin and carried by said supporting-arm, a horizontal ring carried by said supporting-arm and having a cross-bar adapted to receive the upper end of the pivot-pin an adjustable flanged horn adapted to rest upon said ring and a yoke for retaining the flange of the horn in position upon the ring.

28. In a sound recording and reproducing mechanism, a hollow tapering sound-conducting arm constrained to move in a given plane parallel with the face of the record, a sound-box mounted upon the smaller end of

said arm and having communication therewith, means to allow of a movement of the sound-box toward and from the record independent of the hollow arm, a support for the larger end of said arm and an amplifying-horn also carried by said support.

29. In a sound recording or reproducing mechanism, a hollow tapering sound-conducting arm, a sound-box mounted upon the smaller end of said arm, said end comprising a semicircular tube pivoted to the straight portion of said arm.

30. In a talking-machine, a record-support, a hollow swinging arm extending horizontally above the same, movable in a given plane parallel with the face of the record-support, and having a hinged joint intermediate in its length to permit one section to move vertically, and a sound-box having means for holding a stylus-point, said sound-box being mounted upon and communicating with said vertically-movable section and movable away from the record-support to a position to permit the insertion or withdrawal of a stylus-point.

31. In a talking-machine, a swinging longitudinally-extended tapering sound-conducting tube movable in a given plane parallel to that of a record-tablet directly over which the small end of said tube extends, a fixed vertical support provided with a collar in which the larger end of said tube is pivoted, a laterally-extended stub-tube pivotally connected to the small end of said tapering tube whereby it may swing toward and away from the record-tablet independently of said sound-tube, and a longitudinally-projecting tapering horn, swiveled to said collar whereby it may be turned on a vertical axis, said tapering sound-tube, collar and horn constituting a sound-conduit gradually increasing on cross-section from the small end of the sound-tube to the large end of said horn.

32. In a talking-machine adapted to reproduce from a horizontally-disposed flat record-tablet having a record-groove of even depth with lateral undulations in the sides thereof, a record-support, a hollow sound-conducting arm mounted to swing freely in a given plane parallel with said support, a sound-box mounted upon, communicating with one end of said arm and movable independently of said arm toward and away from the record-support, the horizontal movement of said arm and sound-box across the record being substantially uninfluenced by the weight of said arm and sound-box, and a horn having its small end coupled with the other end of said arm.

33. In a talking-machine, a record-support, a hollow sound-conducting arm movable in a given plane parallel with said support, a sound-box mounted upon, communicating with, and movable independently of

said arm toward and away from the record-support, and means forming part of the machine for holding, independent of other means, the said sound-box in an inoperative position relative to the record.

34. In a talking-machine, a record-support, a hollow sound-conducting arm movable in a given plane parallel with said support, and a sound-box mounted upon, communicating with, and movable independently of said arm toward and away from the record-support, said arm serving as a support upon which said sound-box rests and is maintained in an inoperative position.

35. In a talking-machine, a record-support, a hollow sound-conducting arm movable in a given plane parallel with said support, and a sound-box mounted upon, communicating with, and movable independently of said arm, toward and away from the record-support, said sound-box being movable away from the record to, and being adapted to be supported by the arm in an inoperative position independent of other means.

36. In a talking-machine, a record-support, a hollow sound-conducting arm movable in a given plane parallel with said support, and a sound-box mounted upon, communicating with, and movable independently of said arm toward and away from the record-support, said sound-box being movable upwardly and to the other side of its point of support, whereby it may be supported in an inoperative position by contact with said arm or a portion thereof.

37. In a talking-machine, a record-support, a hollow sound-conducting arm movable in a given plane parallel with said support, and a sound-box mounted upon, communicating with, and movable independently of said arm toward and away from the record-support, said sound-box having a removable stylus, and the movement of said sound-box independent of the arm being to an extent to permit the removal and insertion of said stylus.

38. In a talking-machine, a record-support, a sound-tube movable in a given plane parallel with said support, and a sound-box movable toward and away from said support independently of said tube and having a diaphragm extending and movable only in a plane parallel with the axis of said tube when the sound-box is moved away from or toward the record-support.

39. In a talking-machine, a record-support, a sound-tube movable when reproducing in a given plane parallel with the record-support, a sound-box mounted upon and communicating with said tube, said sound-box having a movement independent of the movement of the sound-tube and sound-box in reproducing to move the stylus toward and away from the record-support and means

forming part of said machine for holding, independent of other means, the sound-box in an inoperative position relative to the record.

- 5 40. In a talking-machine, a support, a longitudinally-extending tapering sound-conducting tube having its larger end mounted upon said support to swing in a given plane parallel to that of a record-tablet directly
 10 over which the small end of said tube extends, a laterally-extending stub-tube movably connected with the small end of said tapering tube whereby it can move toward or away from the record-tablet independently
 15 of said sound-tube, and a longitudinally-projecting tapering horn having its small end movably mounted upon said support whereby said horn can swing, the small end of said horn and the larger end of said tapering
 20 sound-tube communicating through said support, and said tapering sound-tube, sup-

port and horn constituting a sound-conduit gradually increasing in cross-section from the small end of the sound-tube to the larger end of said horn.

41. A talking-machine, comprising a tapering sound-conveyer, means for attaching sound-reproducing means to the small end thereof, and a horn-coupling at the large end portion of said conveyer.

42. A talking-machine, comprising a tapering sound-conveyer, means for attaching sound-reproducing means to the small end thereof, and horn-coupling and supporting means with which the other end of said conveyer is movably connected.

In witness whereof I have hereunto set my hand this 23d day of January, 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

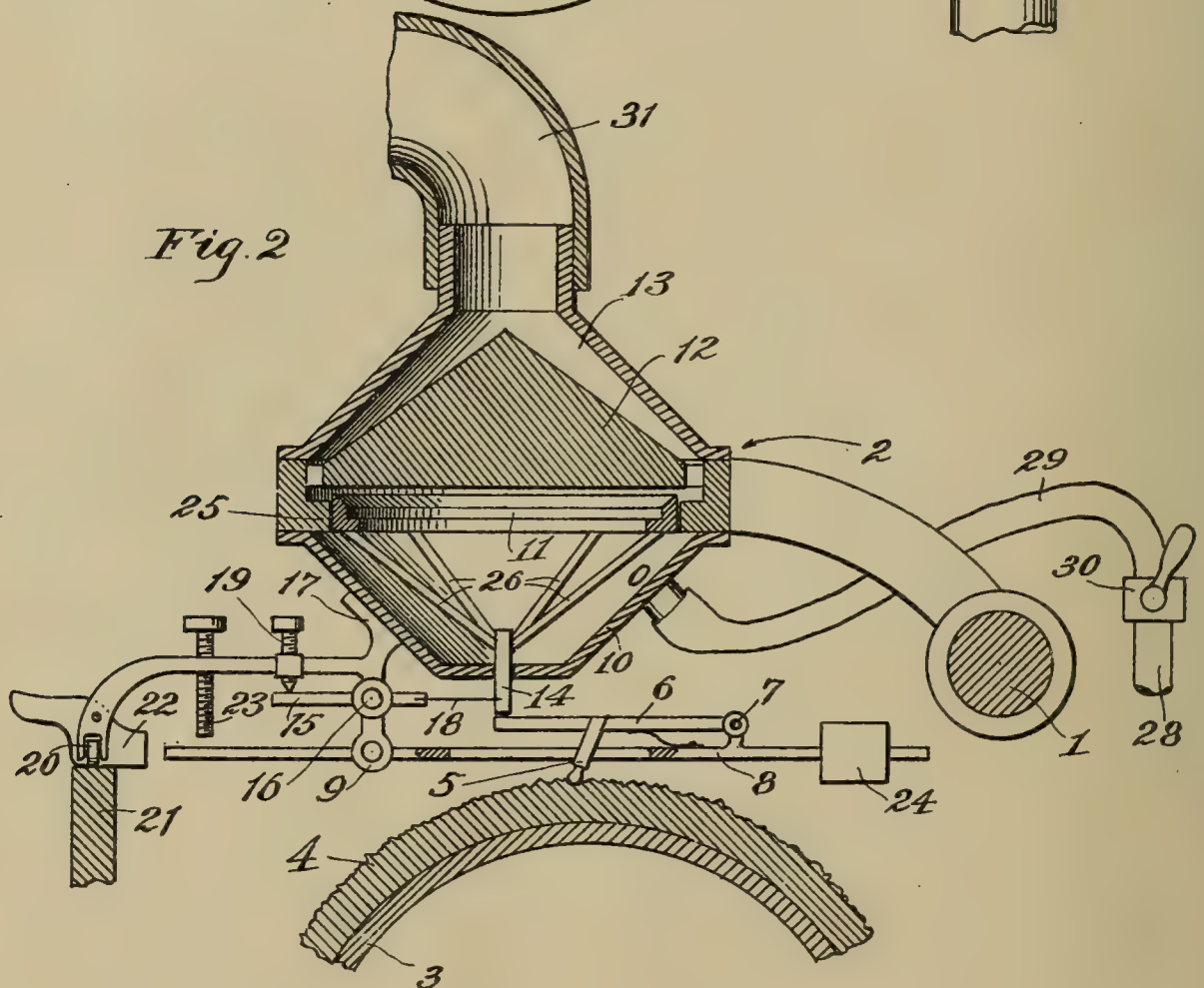
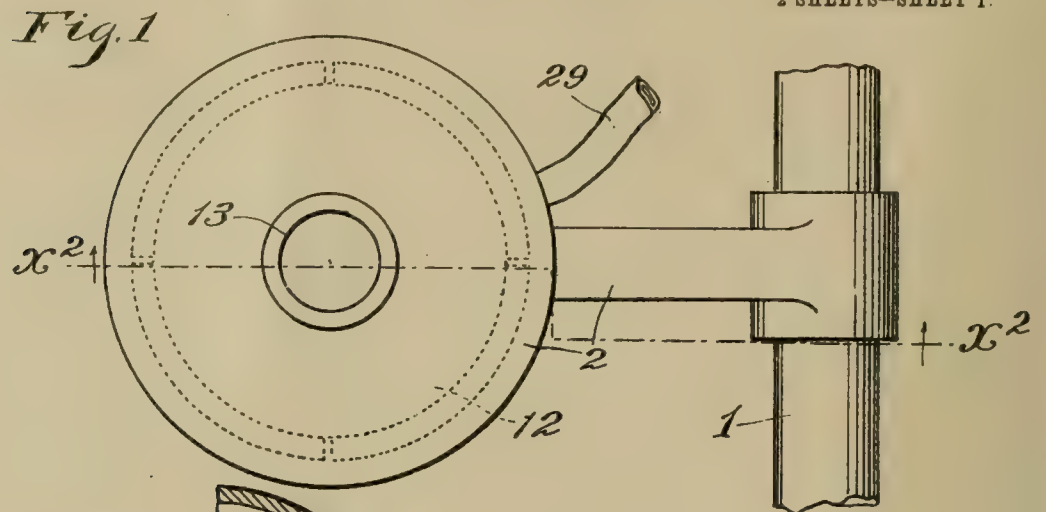
EDW W. VAILL, Jr.,
 JOHN F. GRADY.

J. L. GRAY.

SOUND REPRODUCING AND MAGNIFYING MEANS.

APPLICATION FILED JUNE 23, 1904.

2 SHEETS—SHEET 1.



Witnesses:

C. C. Holly
A. P. Knight

Inventor
Jesse L. Gray.
by Townsend Bros
His Attys

THE [illegible] OF [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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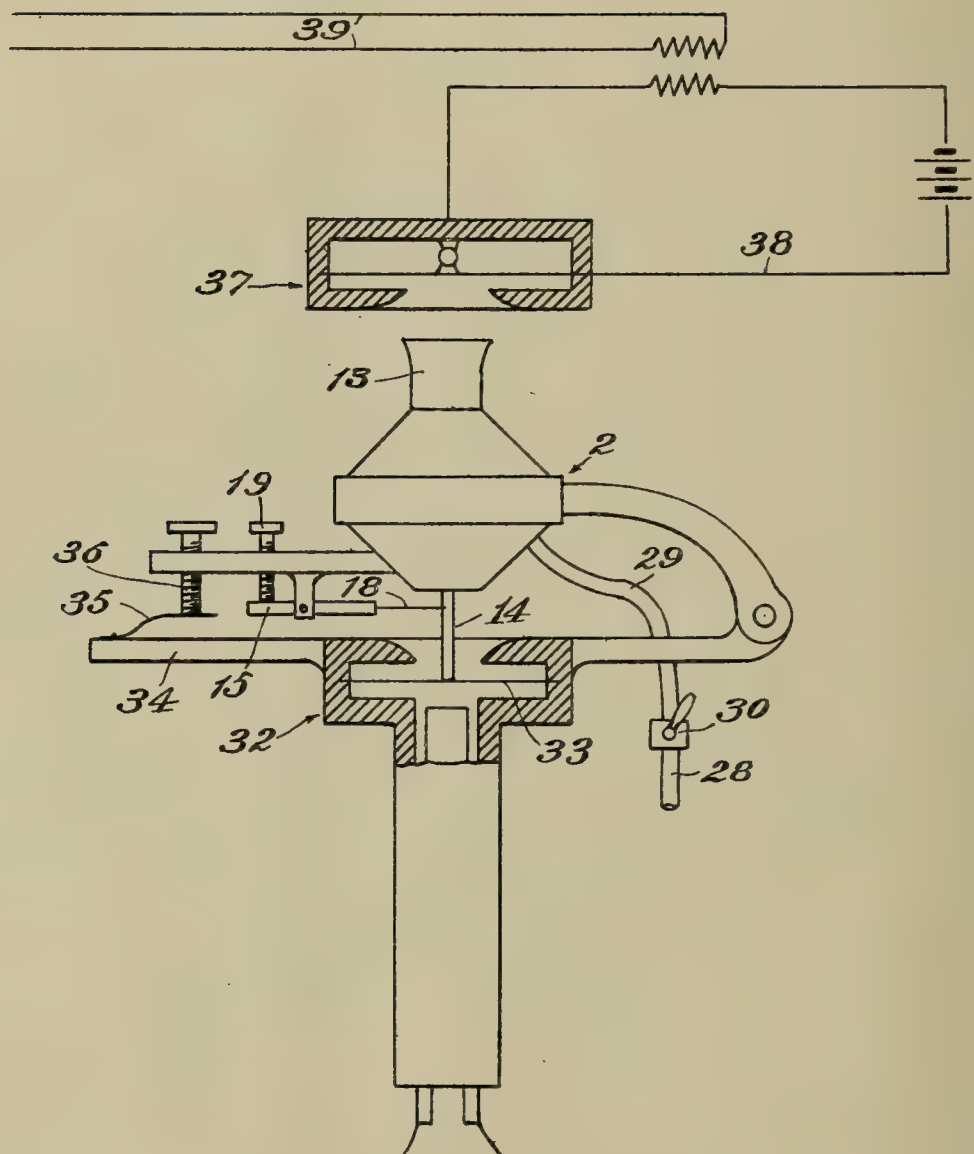
J. L. GRAY.

SOUND REPRODUCING AND MAGNIFYING MEANS.

APPLICATION FILED JUNE 23, 1904.

2 SHEETS—SHEET 2.

Fig. 3.



Witnesses:

L. C. Holly
A. D. Knight

Inventor
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His Atty's

UNITED STATES PATENT OFFICE.

JESSE L. GRAY, OF SANTA ANA, CALIFORNIA, ASSIGNOR OF ONE-HALF
TO PERCY F. RICE, OF SANTA ANA, CALIFORNIA, AND WILLIAM H.
FAUST, OF LOS ANGELES, CALIFORNIA.

SOUND REPRODUCING AND MAGNIFYING MEANS.

No. 814,839.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed June 23, 1904. Serial No. 213,808.

To all whom it may concern:

Be it known that I, JESSE L. GRAY, a citizen of the United States, residing at Santa Ana, in the county of Orange and State of California, have invented a new and useful Sound Reproducing and Magnifying Means, of which the following is a specification.

The primary object of this invention is to provide means for use in connection with a phonographic reproducer for producing impulses in the air directly corresponding to the undulations in the record without the intervention of a solid sound-distributor, such as a diaphragm, thereby preserving the character of the sound-waves without any scratching, rattling, or other extraneous noises.

Another object of the invention is to provide for amplification of the sound to any desired extent and for regulation or variation of the intensity of the sound.

The invention comprises, in connection with a reproducer and means for moving a record in coöperative relation therewith, a valve responsive to the movements of the reproducer and an elastic-fluid-pressure means having an outlet controlled by said valve, the movement of the valve being transverse to the movement of the fluid through the valve and the construction of the valve being such that there is no pressure on the valve due either to the pressure of the fluid or to the movement of the fluid.

The invention also comprises means for regulating the action of the valve and other features, as hereinafter set forth and claimed.

The accompanying drawings illustrate the invention.

Figure 1 is a plan of a phonograph provided with my invention. Fig. 2 is a vertical section on the line $x^2 x^2$ in Fig. 1. Fig. 3 is a diagram showing the application of my invention as a relay for telephones.

1 designates a part of the frame of a phonograph on which the reproducer-carrier 2 is movably mounted.

3 designates a part of the record-carrier, and 4 the record. The means for rotating the record and for moving the reproducer over the record transversely to the movement of the latter are not shown, as they form no part of my present invention.

5 designates the reproducer, which will be of any usual form adapted to the record and

to the machine being used. The form here shown is adapted to a cylindrical record and is supported by a reproducer-arm 6, pivoted at 7 to a weight arm or lever 8, which is pivoted to the carrier 2 at 9.

A chamber or valve-chest 10 is formed in or on the carrier member 2, and a valve member 11 works therein, coöperating with a seat member 12 to control communication from said chamber 10 to an outlet or discharge 13. Said valve is operated by a connection from the reproducer—for example, by means of a pin 14, connected to the valve and bearing against a portion of the reproducer-arm 6—the arrangement of the reproducer-arm 6, the weight-arm 8, and the pin 14 being such that the weight-arm holds the reproducer against the record and by the same action presses the said portion of the reproducer-arm against the end of said pin, so that the said pin and the valve connected thereto will vibrate in correspondence with the undulations in the record. The valve and pin may press on the reproducer-arm by gravity; but it is desirable to provide regulable means for adjusting this pressure. A convenient means for this purpose consists of a lever 15, pivoted at 16 to a bracket 17, attached to the carrier member 2, said lever being provided at one end with a spring extension 18, engaging with the pin, and said lever being engaged at its other end by a set-screw 19, working in said bracket 17. The bracket 17 may also serve as a support for the pivot 9 of the weight-arm and may also carry the usual roller 20, which runs on a track 21 to hold the reproducer-carrier at the proper height. 22 designates a lifting-cam on said bracket 17 to engage the track 21 and hold the reproducer-carrier in elevated position when desired, so that the reproducer will be free of the record.

23 designates an abutment, which may be formed as a set-screw working in the bracket 17, adapted to engage a part or extension of the weight arm or lever 8 to limit the movement thereof, so that when the carrier member 2 is raised, either partially by means of the cam device 22 or is thrown clear over for any reason, the said abutment will prevent the weight-arm from moving except for a limited distance, this distance being, however, sufficient to allow of the movement of the parts required in the reproducing action.

24 designates the weight on the weight-arm, which may be adjustable.

It is desirable that the valve should have a considerable linear extension of port-opening, so as to provide for a considerable variation in size of the opening with an extremely limited movement of the valve, and it is also desirable that the valve should be as light as possible, so as to respond readily and accurately to the movements of the reproducer. To this end the valve 11 may be formed as a ring working in a cylindrical bearing or guide 25 in the carrier 2 at the top of chamber 10 and having its upper edge or lip opposing the flat lower face of the seat member 12, the said valve-ring being connected with the operating-pin 14 by a spider or connecting-arms 26. The seat 12 extends in a plane transverse to the direction of the movement of the valve. The pin 14 extends through a hole in the wall or casing 10, fitting sufficiently close in said hole to substantially prevent leakage thereat, while enabling its free longitudinal movement therein. The valve-ring 11 works by a sliding fit within the cylindrical bearing 25, and the upper edge of the valve-ring is flared or beveled outwardly, so that its lip or part coöperating with or opposing the flat lower face of the seat member 12 is substantially limited to a peripheral portion of the valve-ring of negligible width, and the pressure of the fluid medium on the parts of said valve within the chamber and exposed to such pressure is substantially balanced as regards movement of the valve toward and from its seat. The valve being annular, the pressure is also balanced in a transverse direction. The pressure of the medium does not, therefore, resist or interfere with the movement of the valve in response to the undulations of the record.

28 designates an air-supply pipe or connection connected to any suitable source of air or gas pressure, (not shown)—for example, to any ordinary form of pump—said pipe being connected through a flexible tube 29 with the valve-chamber 10. Means may be provided for regulating the air-pressure—for example, a valve 30 in the supply connection, which may also be used to cut off the air or gas supply whenever desired.

31 designates a conveyer for the sound-waves from the outlet 13, which may be connected to any of the usual means, such as a horn or tube, for properly directing the sound.

In using the device it will be understood that the valve 11 is so close to the valve-seat that the passage of air therethrough will be restricted and the minute movements of the valve, due to the undulations in the record, will appreciably affect the passage of air between the valve and seat. Assuming that the record has been put in place, that the reproducer has been lowered thereonto, and that the machine has been set in opera-

tion, the record traveling under the reproducer will raise and lower the same and correspondingly move the valve to vary the cross-section of the port or outlet of the valve in correspondence with the undulations of the record. The air or gas or other elastic fluid having been turned on at 30 will fill the chamber 10 and will escape therefrom through the valve in a current whose flow will vary or undulate in accordance with the undulations in the record, thereby reproducing in pulsations of air emitted through the outlet 13 the sound which the record represents.

By means of the adjusting device 19 the valve can be adjusted to or from its seat without disturbing the position of the reproducer; but the movements of the reproducer are communicated to the valve by reason of the pressure of the weight 24. Said weight 24 serves to maintain constant pressure on the stylus and to maintain the lever 6 in contact with pin 14 irrespective of the movement of said pin under the influence of the device 19. The bearing of the valve-ring 11 on the seat 12 is limited substantially to a single annular line of contact, so that the normal pressure of fluid in the valve-chamber will not tend to force the valve to its seat on the disk 12. The valve member 11 will be preferably adjusted so as to normally lie in close proximity to the seat member 12, so that the compressed-air or fluid pressure medium will stream or pass between said valve under the action of the record in a diverging annular current, whose volume, quantity, or force is dependent on the size of the outlet between the valve and its seat. This outlet extends transversely to the movement of the valve.

The air or medium moving through the outlet has therefore no effect of itself on the valve, and the valve in its movement does not have to overcome the momentum of the air-current, nor is it, on the other hand, accelerated by such momentum. The movements of the valve are therefore not affected by the pressure or the movement of the air or fluid pressure medium, and thus there is no distortion or interference with the vibration of the valve in correspondence with the record, even at high pressure. The spring 18 and weight 24 serve to yieldingly hold the valve and the reproducer in proper position, while allowing their independent adjustment, but enabling the reproducer to operate the valve in correspondence with the record or with the sound undulations.

Various modifications may be made in the device without departing from my invention, and the invention may also be used for various purposes—for example, by suitable adaptation it may be used in repeating or relaying telephone-messages.

The intensity of sound reproduced can be regulated by properly controlling the air-

pressure, and clearness of sound can be obtained by proper adjustment of the means for regulating the pressure on the valve. When properly controlled, the reproduction both of musical sound and of articulate speech, and particularly of the singing voice, is clear and free from any scratching or rattling noise.

The adaptation of my invention to a telephone repeater or relay is shown in Fig. 3, where 32 designates the telephone whose diaphragm 33 is connected to or engages with the pin or member 14 of the valve, which may be of the same construction as shown in Fig. 2, this valve-chamber body 10 being supported on an arm 34, adjustable and yieldingly supported by spring 35 and set-screw 36 to enable the pressure on the valve and diaphragm to be regulated. A telephone-transmitter 37 is located in position to receive the magnified and amplified sound emitted from the outlet 13 of the valve and is connected to the transmitting local and line circuits 38 39 in the usual manner. Adjusting device 15 18 19 and pneumatic connection 28 29 30 may be the same as in Fig. 2.

What I claim is—

1. In combination with a phonograph-reproducer, an annular valve controlled thereby to move in response to the movements of the reproducer, a chamber having a supply connection for an elastic fluid and provided with a bearing within which said annular valve slides, and a seat for said annular valve, the annular valve having a seat-opposing portion of substantially the same diameter as the part that slides in the bearing.

2. In combination with a phonograph-reproducer, an annular valve controlled thereby to move in response to the movements of the reproducer, a chamber having a supply connection for an elastic fluid and provided with a bearing within which said annular valve slides, and a seat for said annular valve, said annular valve having a flared upper end terminating in an annular valve-lip of the same diameter as the bearing for the valve.

3. In combination with a phonograph-reproducer, an annular valve controlled thereby to move in response to the movement of the reproducer, a chamber having a supply connection for elastic fluid and provided with a bearing wherein said valve slides, and a flat seat for the valve extending in a plane transversely to the movement of the valve.

4. In combination, a chamber having a fluid-pressure supply and outlet valve, a record-carrier, a reproducer, a movable support for the reproducer operatively engaging the valve, means for operating on the movable support to press the reproducer toward the record-carrier, and adjustable means connected to the valve to adjust its position independently of the reproducer.

5. In combination with a phonographic

reproducer, a valve-chamber and a valve working therein, and operatively connected to the reproducer, means for passing fluid through said chamber and valve, a movable support for the reproducer, means to control the operating pressure of the reproducer and adjustable resilient means connected to the valve to adjust its position independently of the position and pressure of the reproducer.

6. In combination, a carrier, a lever pivoted thereto and provided with pressure means, an arm pivoted to said lever and carrying a reproducer, a valve-chamber, a valve working in said chamber and operatively engaging the reproducer-carrying arm, and adjustable resilient means connected to the valve to adjust the same independently of the position of the reproducer and of the pressure exerted thereon by the aforesaid pressure means.

7. In combination with a record-carrier, a pivoted reproducer-carrier, movable bodily with its attached parts to and from the record-carrier to bring it into and out of operative position, a lever pivoted to the reproducer-carrier and having pressure means, an arm pivoted to said lever and carrying a reproducer, a valve-chamber carried by the reproducer-carrier, a valve working in said chamber and operatively engaging the reproducer-arm, a lever pivoted to the reproducer-carrier and having a resilient connection with said valve, means for adjusting the last-named lever and means for passing fluid through said valve-chamber under control of said valve.

8. In a sound-reproducing apparatus, in combination, a member movable in accordance with sound undulations, a carrier movable toward and from said member, a valve-chamber on said carrier, a valve working within said chamber and operatively connected to said member, means for passing fluid through said chamber under control of said valve, an independent means for adjustment of the carrier and of the position of the valve, each of said adjusting means comprising a part for yielding by supporting the parts adjusted thereby.

9. In a sound-reproducing apparatus, in combination, a member movable in accordance with sound undulations, a carrier movable toward and from said member, a valve-chamber on said carrier, a valve working within said chamber and operatively connected to said member, means for passing fluid through said chamber under control of said valve, the movement of the fluid being transverse to the movement of the valve, and the parts of the valve exposed to pressure by said fluid, being balanced relatively to the direction of movement of the valve.

10. In a sound-reproducing apparatus, in combination, a member movable in accordance with sound undulations, a carrier mov-

able toward and from said member, a valve-
chamber on said carrier, a valve working
within said chamber and operatively con-
nected to said member, means for passing fluid
5 through said chamber under control of said
valve, the movement of the fluid being trans-
verse to the movement of the valve, and the
parts of the valve exposed to pressure by
said fluid, being balanced relatively to the di-
10 rection of movement of the valve, and means

for adjusting the position of the valve inde-
pendently of the position of the operating
member.

In testimony whereof I have hereunto set
my hand, at Los Angeles, California, this 15th 15
day of June, 1904.

JESSE L. GRAY.

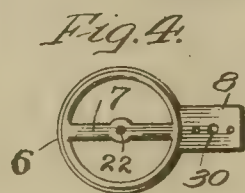
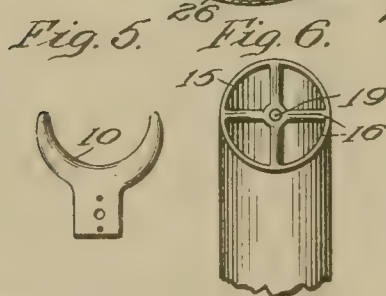
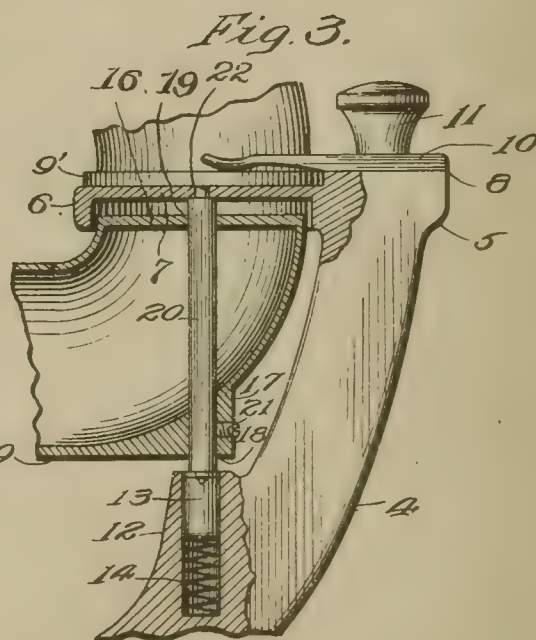
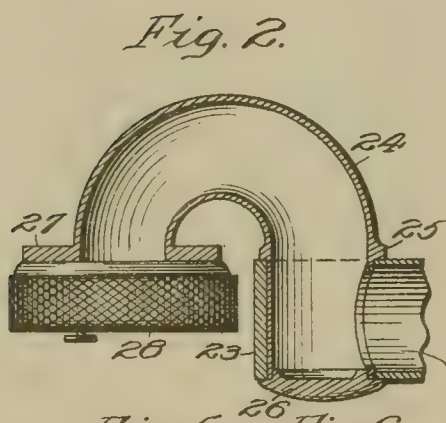
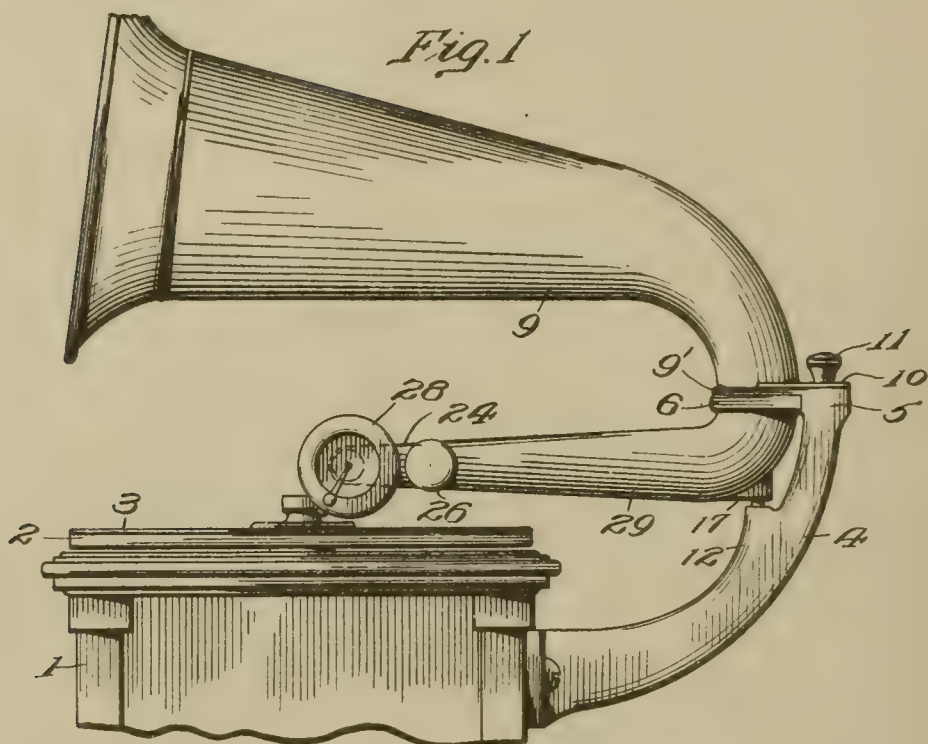
In presence of—

ARTHUR P. KNIGHT,
JULIA TOWNSEND.

No. 814,848.

PATENTED MAR. 13, 1906.

E. R. JOHNSON.
AMPLIFYING HORN.
APPLICATION FILED FEB. 9, 1904.



WITNESSES:
H. J. Hartman.
Edw. W. Vaill Jr.

INVENTOR
Eldridge R. Johnson
BY
Wm. B. Pettit
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

AMPLIFYING-HORN.

No. 814,848.

Specification of Letters Patent.

Patented March 13, 1906.

Original application filed February 12, 1903, Serial No. 143,060. Divided and this application filed February 9, 1904. Serial
No. 192,735.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, of Merion, Montgomery county, State of Pennsylvania, have invented certain new and
5 useful Improvements in Amplifying-Horns, of which the following is a full, clear, and complete disclosure.

The object of this form of my invention is to provide an amplifying-horn, principally for
10 use with talking-machines, of such a character that the same will have all the material advantages of a single horn connected directly to the sound-box, but without having the disadvantages due to long passages of small and
15 practically constant diameter, to the weight of the bell portion of the amplifying-horn, and to abrupt turns in connecting-tubes.

This application is a division of my prior application, filed February 12, 1903, Serial
20 No. 143,060, which covers certain features of construction of talking-machines which are shown, but not claimed herein.

The subject-matter of this application particularly pertains to the sound-conveying portions considered as a continuous tapering
25 horn having joints therein to allow movement of the sound-box and the adjustment of the position of the bell portion of the horn.

In talking-machines with which amplifying-horns are used for delivering the reproduced sounds it is desirable to obtain the highest degree of quality and volume of tone that is possible. To this end large horns are
30 used; but the weight of such horns must be so distributed as not to cause any bearing upon the sound-box to increase the weight on the stylus or needle or otherwise interfere with the free movement thereof. Heretofore the amplifying-horn in the usual form of talking-
40 machines has been carried by a pivoted arm, to the end of which is attached the sound-box, which has direct communication with the small end of said arm, and such a construction materially affects the operation of the
45 sound-box when the horn is changed in direction or position or varied in size.

One special object, therefore, of my invention is to provide such an amplifying-horn that the effect will be the same as though the
50 horn were connected directly to the sound-box, as in the former types of talking-machines, without the disadvantages due to the

weight of the horn and without employing long passages of small and practically constant diameter, while the larger end of the
55 horn may be directed to any point of the compass without affecting the sound-box or the position of the machine.

For a full, clear, and exact description of that portion of my invention to be covered
60 by this application reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a side elevation of my improved
65 talking-machine; Fig. 2, a horizontal sectional view of the small or hollow arm portion of the amplifying-horn, showing means to allow of the vertical movement of the sound-box; Fig. 3, a sectional view showing means whereby
70 the larger portion of the horn is adjustably mounted and the hollow arms or lower portion of the horn is pivoted so as to communicate therewith; Fig. 4, a plan view of the end
75 of the support for the larger portion of the amplifying-horn; Fig. 5, a view of the yoke for holding the same in position upon its support, and Fig. 6 a plan view of the hollow arm or pivoted portion of the amplifying-horn.

The numeral 1 indicates the usual motor-
80 casing, above which revolves the usual turntable 2 and upon which is carried the sound-record 3. At one side of the casing 1 a bracket or arm 4 is provided, which is similar in shape to those already in use excepting its upper
85 end portion. This upper end portion 5 consists of a ring 6, having a bar 7 across one diameter thereof. The bell portion 9 of amplifying-horn is provided at its end with a flange
90 9', which is adapted to be seated upon the ring 6 of the support 4. The upper end of the support 5 is provided with a flat portion 8, having a screw-hole 30 therein. Upon this flat portion a yoke 10 is adapted to be fixed
95 by the thumb-screw 11. The arms of this yoke 10 project over the ring 6 and are adapted to press upon the flange 9 of the bell portion of the amplifying-horn, and thereby retain said portion in position. It will be noticed that this construction enables the bell
100 portion of the horn to be directed at any angle horizontally to send the sound to any point which choice or convenience may require. The arms of the yoke 10 are slightly

curved and are made of spring material, so that the bell portion of the horn may be easily placed in position and removed.

Upon the arm 4 a boss or projection 12 is provided which is recessed internally to provide a socket for a bearing-block 13, which is forced upwardly by a coiled spring 14. The horizontally-pivoted portion 29 of the amplifying-horn is curved upwardly and terminates in a ring 15, having spider-arms 16 across two diameters thereof. Upon the elbow or curve of the horizontally-pivoted section of the horn is provided a boss 17, having a hole 18 therein which corresponds with a hole 19 in the spider at the end of said curved portion. A vertical pivot pin or bar 20 passes through these holes or openings and is retained in position by the set-screw 21. The lower end of this pivot-bar 20 has a bearing in the spring-pressed block 13 and its upper end enters the bearing 22 in the bar 7 of the support 4. The parts are of such a size and are so adjusted that the upper end of the pivoted portion of the horn will enter the ring 6 for a short distance, but sufficient space is left between said parts to allow said pivoted portion to swing freely and yet to provide a practically sound-tight joint.

By the above-described construction it will be seen that the ring 6 forms not only a support for the delivery portion 9 of the amplifying-horn, but also forms a coupling between the portion 29 of the amplifying-horn, forming a part of the reproducing mechanism and the portion 9, and although the ring 6 telescopes with the curved portion of the section 29 of the amplifying-horn, yet said ring merely provides a connecting element and may be made as narrow as consistent with strength to bring the two sections of the amplifying-horn 9 and 29 in as close proximity as is desired, thereby practically making said sections or portions 9 and 29 one continuously-tapering horn.

The joint for allowing a vertical movement to the sound-box is constructed as follows: The inner or smaller end of the horizontally-pivoted portion 29 of the amplifying-horn is provided with a strap or ring 23, which is adapted to receive and form a bearing or socket for the end of a semicircular piece of tubing 24. The end of this piece of tubing 24 is held in position by suitable flange 25 and by a cap 26, which also serves to close the outer end thereof. To the other end of the curved tubing 24 is attached the plate 27, which carries the usual sound-box 28. It will be seen that by this construction the sound-box is brought practically into alinement with the end of the horizontally-pivoted portion of the horn and is therefore on a radius from the axis of the pivot-bar 20.

By the constructions above described it will be seen that I have provided a very simple, efficient, and attractive means for con-

ducting the sound-waves generated in the sound-box through the amplifying-horn to any point desired. The fact that all portions of the conducting tube or horn are tapered allows the sound-waves to advance with a regular and natural increase in their wave fronts in a manner similar to that of ordinary musical instruments, obviating the disadvantages due to long passages of small and practically constant diameter having abrupt turns. The means for supporting the bell portion 9 of the horn also provides a firm support therefor and are placed at a point in the horn where the same is not so small as to require special means for strengthening its supporting portion.

Changes in details may be made without departing from the spirit and scope of my invention; but,

Having described the nature thereof, what I claim, and desire to protect by Letters Patent of the United States, is—

1. A tapering amplifying-horn having independently-supported movable coupled sections.

2. A tapering amplifying-horn having independently-supported laterally-movable coupled sections.

3. A tapering amplifying-horn having two tapering radial sections connected by a vertically-curved portion, said sections movable about a vertical axis.

4. A tapering amplifying-horn having two tapering radial sections in different horizontal planes and movable about a vertical axis.

5. A tapering amplifying-horn having two tapering radial sections independently movable about a vertical axis.

6. A tapering amplifying-horn having two independently-supported radial tapering sections, movable about a vertical axis, said sections lying in substantially parallel planes and movable only in said planes.

7. An amplifying-horn, comprising a continuously-tapering tube having a joint to allow a movement of one end of said horn in relation to the other, said horn being supported at said joint.

8. An amplifying-horn, comprising a continuously-tapering tube having a joint in the tapering portion thereof to allow independent lateral movement of the ends thereof in different horizontal planes, said horn being supported at said joint.

9. An amplifying-horn, comprising a continuously-tapering tube having a joint in the tapering portion of said horn to allow horizontal movement of the smaller end of said tube independently of the larger or bell portion thereof, said horn being supported at said joint.

10. An amplifying-horn, comprising a tapering curved tube, said tube being pivoted on a substantially vertical axis to allow a horizontal movement of the smaller end of

said tube, the curved portion of said horn connecting sections thereof lying in substantially parallel planes:

11. An amplifying-horn, comprising a tapering curved tube, said tube being pivoted on a substantially vertical axis to allow a horizontal movement of the smaller end of said tube, the curved portion of said horn connecting sections thereof lying in substantially parallel planes, said axis passing through or adjacent said curved portion.

12. An amplifying-horn, comprising a substantially U-shaped tube tapering from end to end, having substantially horizontal arms, the curved portion of said tube being pivoted on a substantially vertical axis, about which said arms swing.

13. An amplifying-horn, comprising a U-shaped tube tapering from end to end having

its curved portion supported on a substantially vertical axis, and a joint in said curved portion to allow of independent horizontal movement of the smaller and larger ends of said tube, about said vertical axis.

14. An amplifying-horn, comprising a curved tube tapering from end to end, and having a joint to allow of independent horizontal movement of the smaller end of said tube about a substantially vertical axis, the larger portion of said tube being rigidly supported and capable of adjustment to swing in different directions.

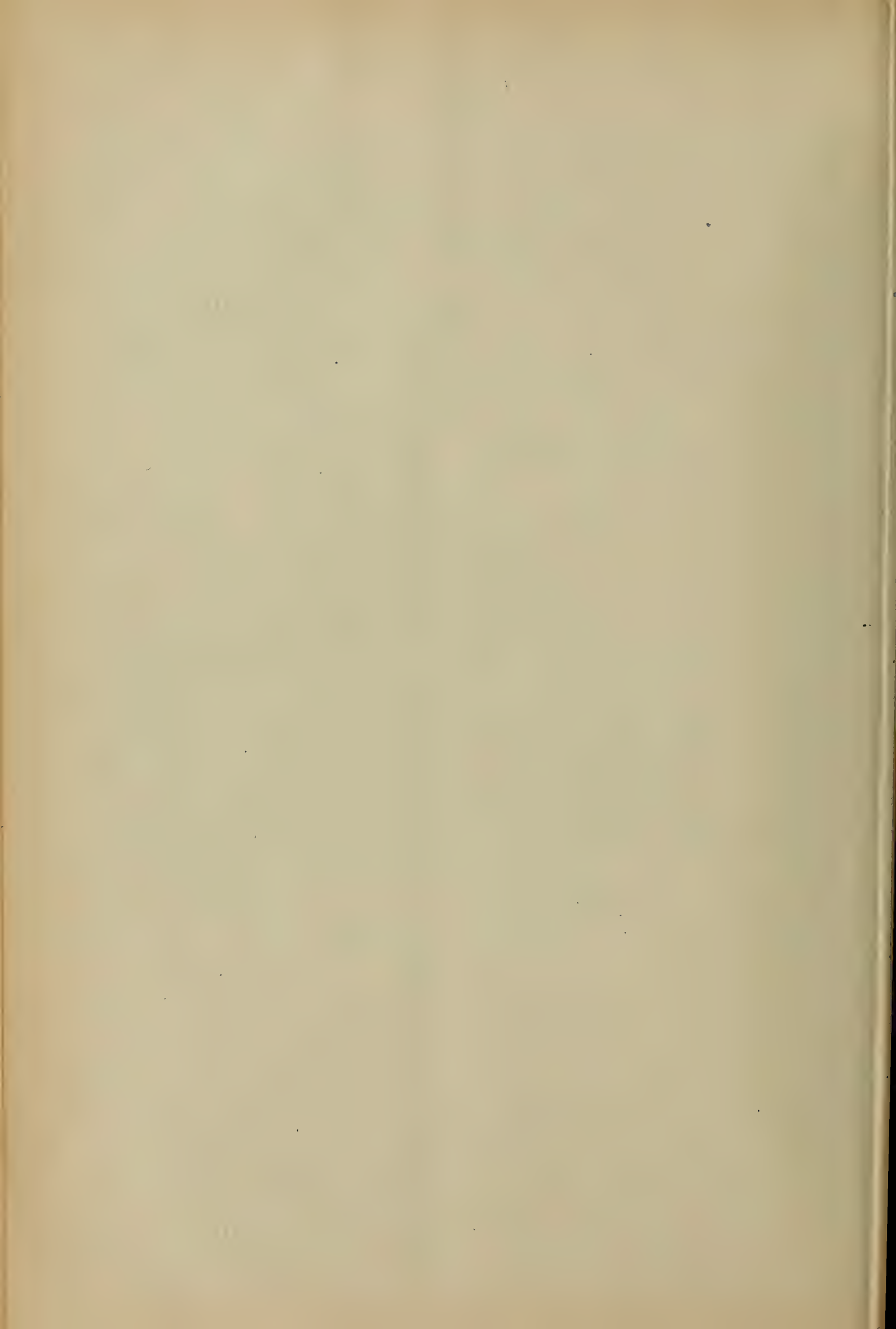
In witness whereof I have hereunto set my hand this 8th day of February, 1904.

ELDRIDGE R. JOHNSON.

Witnesses:

JOHN F. GRADY,
J. HENDERSON.

*I want this patent
for the same invention
as the one of 814,848? (and
just as I did one of them and
see copy of 814,848*



L. L. TERHUNE.
HORN FOR RECEIVING AND DELIVERING SOUND.
APPLICATION FILED MAY 22, 1903.

Fig. 3.

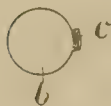


Fig. 4.

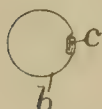


Fig. 5.

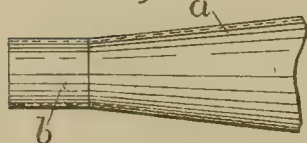


Fig. 6.

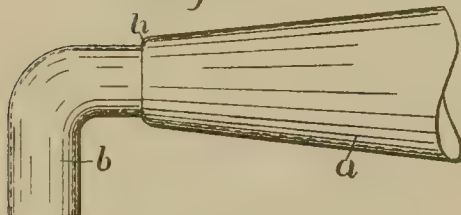


Fig. 7.

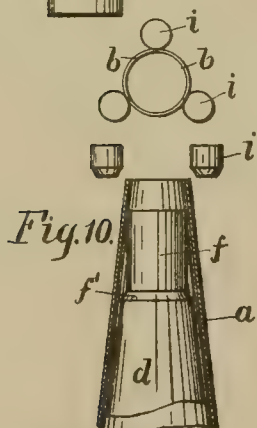
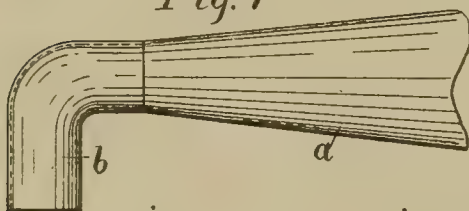


Fig. 10.

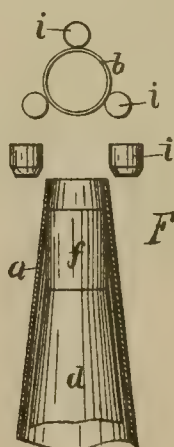


Fig. 11.

Fig. 1.

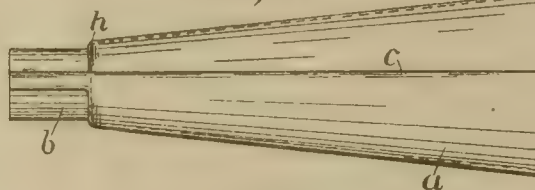


Fig. 2.

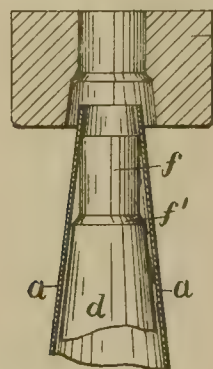
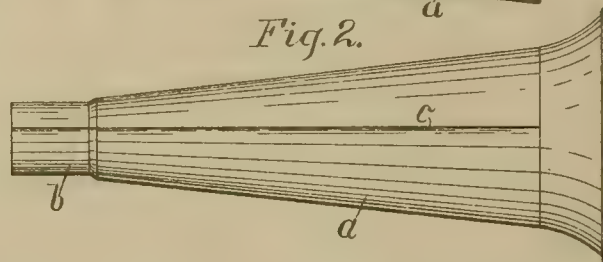


Fig. 8.

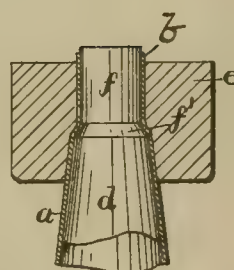


Fig. 9.

WITNESSES:
W. M. Sanders
L. M. Sanders

INVENTOR
Leonard L. Terhune
BY
Frank C. Fischer
ATTORNEY

UNITED STATES PATENT OFFICE.

LEONARD L. TERHUNE, OF NEWARK, NEW JERSEY.

HORN FOR RECEIVING AND DELIVERING SOUND.

No. 814,891.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed May 22, 1903. Serial No. 158,244.

To all whom it may concern:

Be it known that I, LEONARD L. TERHUNE, a citizen of the United States, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Horns for Receiving and Delivering Sound; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in horns for use in receiving and concentrating sound and for delivering and amplifying sound, and is particularly applicable to recording and reproducing horns on talking-machines.

The object of my invention is to construct a horn made of one piece of material having the ferrule formed integral with the body of the horn, thereby reducing the cost of manufacture considerably and producing a more rigid and durable construction. Heretofore it has been customary to form the conical body of the horn in one piece and the cylindrical ferrule of the horn of another piece and then uniting the two pieces by soldering them together. This construction has been very objectionable in view of the fact that the acid used in the soldering process would invariably run into the seam of the conical part of the horn and prevent the japan with which the horn is usually covered from adhering to the seam at that particular point where the acid would run.

In the accompanying drawings, Figures 1 and 2 are longitudinal views of a horn in which my improvement is shown. Figs. 3 and 4 are end views of the same, illustrating the seam of the horn in one case, as in Fig. 3, on the outside of the ferrule and the seam in Fig. 4 on the inside of the ferrule. Figs. 5, 6, and 7 are partial longitudinal views of a horn in which modified forms of my improvement are shown. Fig. 8 shows a horn-blank placed upon a tapering mandrel with the forming-die arranged above it preparatory to forming the cylindrical ferrule thereon. Fig. 9 shows the finished horn on the mandrel with the die in position. Fig. 10 shows a horn-blank placed upon a tapering mandrel with the forming-die, consisting of three rollers, suitably mounted above the same pre-

paratory to forming the cylindrical ferrule thereon. Fig. 11 shows a modified form of mandrel.

In describing my improvement I shall call attention to the accompanying drawings, where like references indicate corresponding parts of the different views of the same.

a indicates the conical body of the horn, and *b* the cylindrical ferrule, which is formed integral therewith.

c indicates a lock-seam of the ordinary kind extending lengthwise of the horn. In Fig. 3 the lock-seam is shown on the outside of the cylindrical ferrule *b*, while in Fig. 4 it is shown on the inside of the same. In a small horn, especially one which fits directly on the cylindrical extension of the recorder or reproducer, it is desirable to form the seam *c* on the outside of the cylindrical ferrule *b*, so as to form a cylindrical interior in the ferrule, which permits the ferrule to be readily placed over the cylindrical extension of the recorder or reproducer, while in horns of larger dimensions, where a tube is used to make connections between the ferrule of the horn and the cylindrical exterior of the recorder or reproducer, the construction of the seam as shown in Fig. 4 is desirable.

h is a shoulder formed between the conical body of the horn *a* and the cylindrical ferrule *b*.

The manufacturing process of my improved horn is very simple and is as follows: The conical body-blank of the horn *a*, made of any suitable material, consisting of one piece of material, is formed into a conical body and placed on a tapering mandrel *d*, provided with a cylindrical extension *f* and a shoulder *f'*, as in Fig. 8, and a cylindrical forming-die *e* is forced down over it, as shown in Fig. 9, which crowds the metal of the conical body-blank around the cylindrical extension *f* of the mandrel *d*, causing the metal of the conical body-blank to be formed as shown in Figs. 1 and 2 and provided with the cylindrical ferrule *b* at its apex and the shoulder *h* between the conical body of the horn *a* and the cylindrical ferrule *b*.

The tapering mandrel *d* in Fig. 11 is devoid of the shoulder *f'*, Fig. 8, so as to form a horn, as illustrated in Figs. 5 and 7.

In Figs. 6 and 7 I have shown the cylindrical ferrule *b* provided with a rectangular extension, so that the horn may be used on a disk talking-machine as distinguished from the horn used on a cylindrical machine.

In Figs 10 and 11 I have shown a modified form of die which consists of a series of small rollers *i*, suitably mounted in a frame, which in this case can be fed over the apex of the horn-blank when the same is placed on the mandrel and crowd the metal around the same, or the horn and mandrel together may be fed into the die, thereby producing the same results.

10 The horn is preferably made of brass, although it is evident that other well-known materials—such as papier-mâché, metal, celluloid, &c.—might be substituted.

15 What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

20 1. An amplifying-horn, having a conical body, a cylindrical ferrule and a shoulder connecting said body and ferrule, said ferrule and shoulder being swaged from said conical body.

2. An amplifying-horn, having a conical body and a cylindrical ferrule, a shoulder connecting said body and ferrule, said shoulder and ferrule being swaged from the body of the horn, and the end of the ferrule being bent at right angles to that portion thereof which is adjacent to the body of the horn.

3. The improved horn having a longitudinal seam formed by turning and interlocking the opposite edges of said horn, said horn having a cylindrical small end and a flaring large end, the said longitudinal seam projecting inwardly throughout the length of the flaring and cylindrical parts.

This specification signed and witnessed this 20th day of May, 1903.

LEONARD L. TERHUNE.

Witnesses:

FREDK. C. FISCHER,
HUGO BOEPPLE, Jr.

No. 814,941.

PATENTED MAR. 13, 1906.

C. L. CHISHOLM.

PITCH INDICATING ATTACHMENT FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED AUG. 8, 1905.

5 SHEETS—SHEET 1.

Fig. 1.

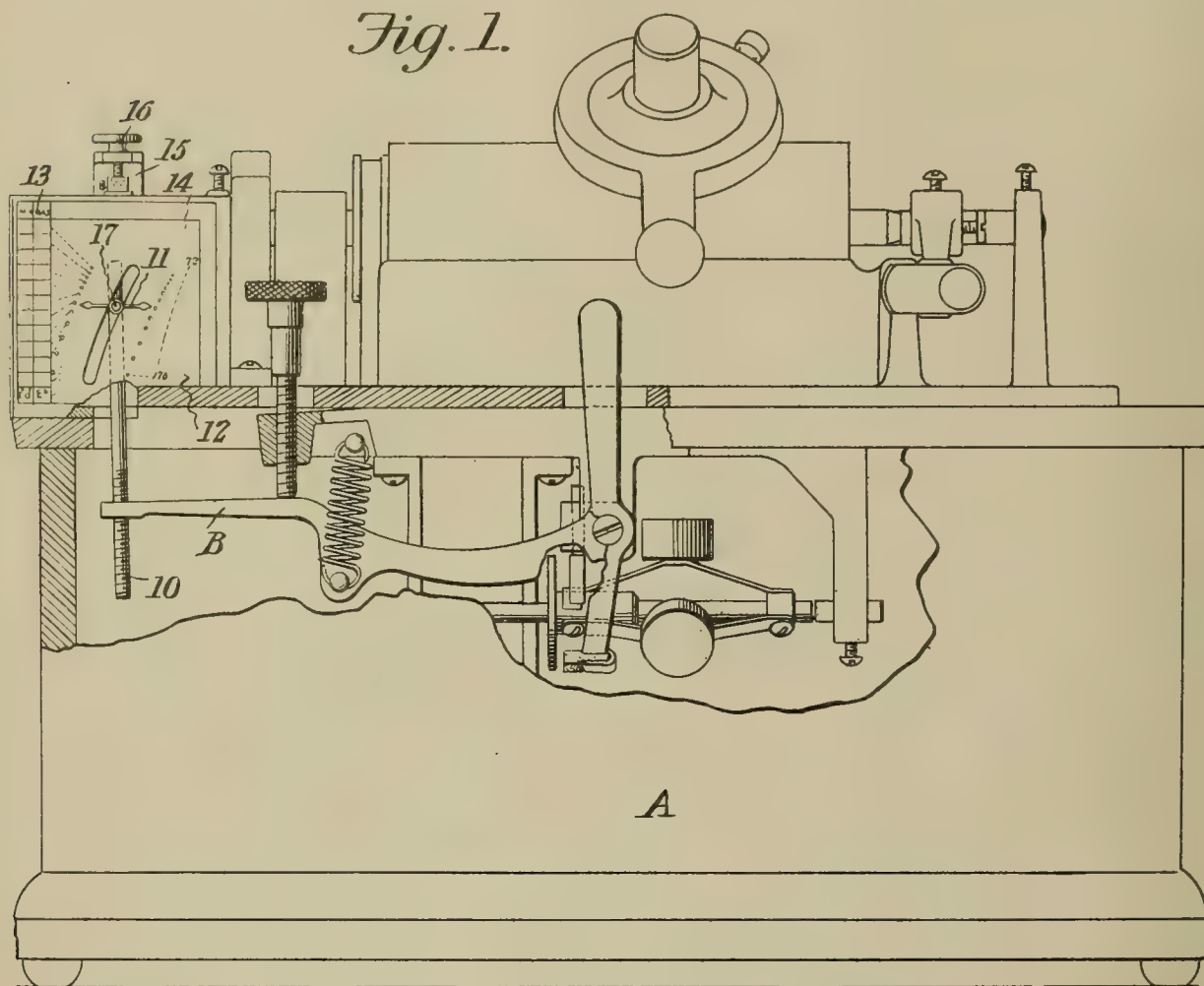
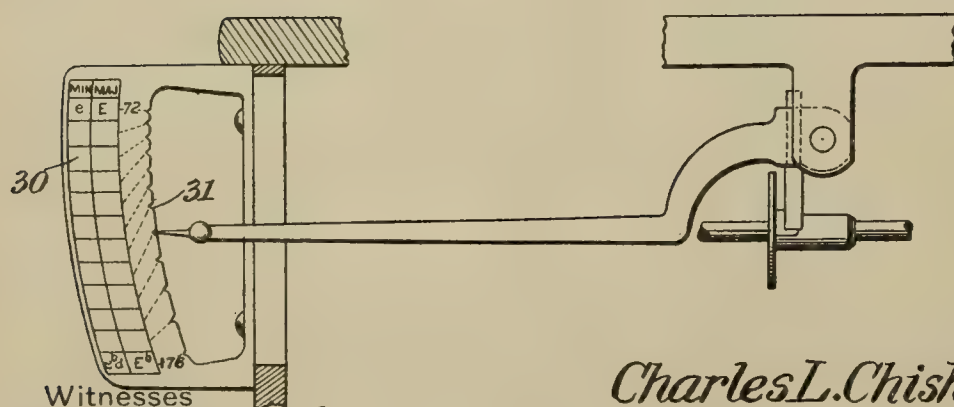


Fig. 8.



Witnesses

E. J. Stewart
John E. Carter

Charles L. Chisholm Inventor

by *Chas. Snow & Co.*
Attorneys

PATENTED MAR. 13, 1906.

PITCH INDICATING ATTACHMENT FOR SOUND REPRODUCING MACHINES.

5 SHEETS—SHEET 2.

Fig. 2.

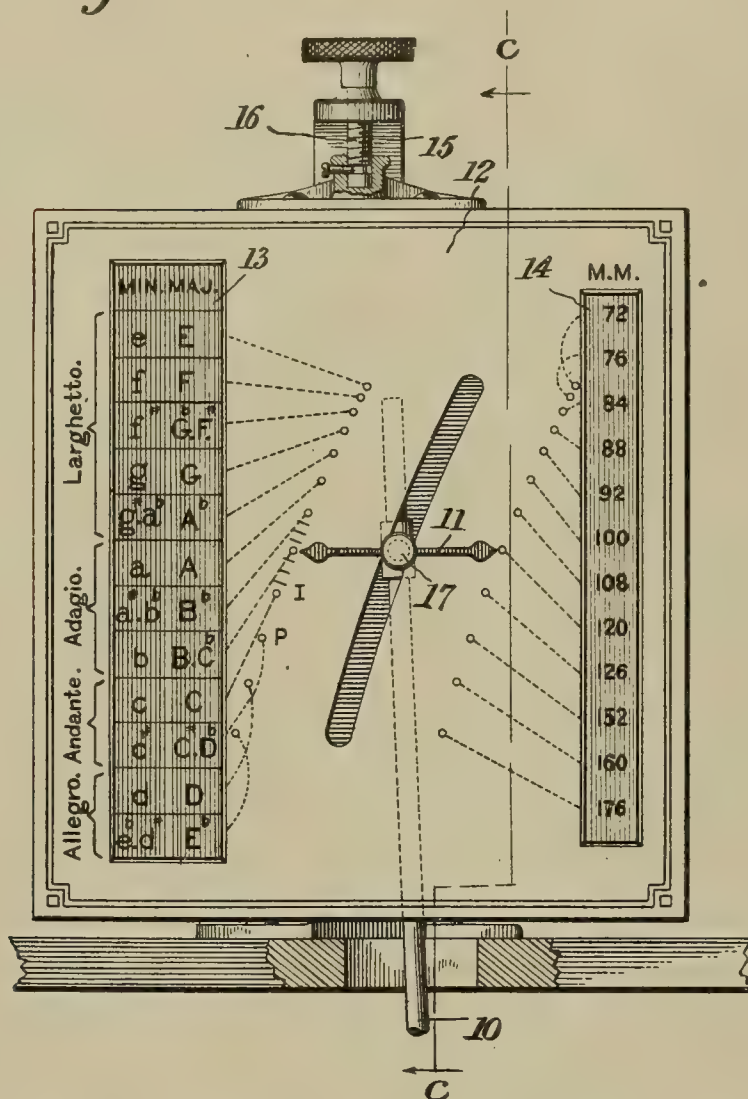


Fig. 3.

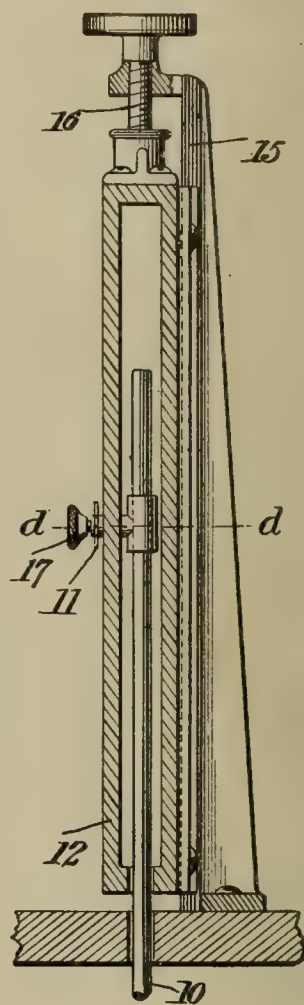
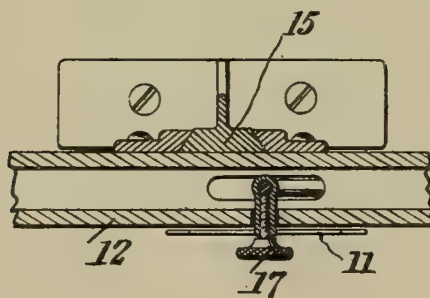


Fig. 4.



Witnesses

E. F. Stewart
Jno Parker

Charles L. Chisholm Inventor

by *Cashnow & Co*
Attorneys

Fig. 5.

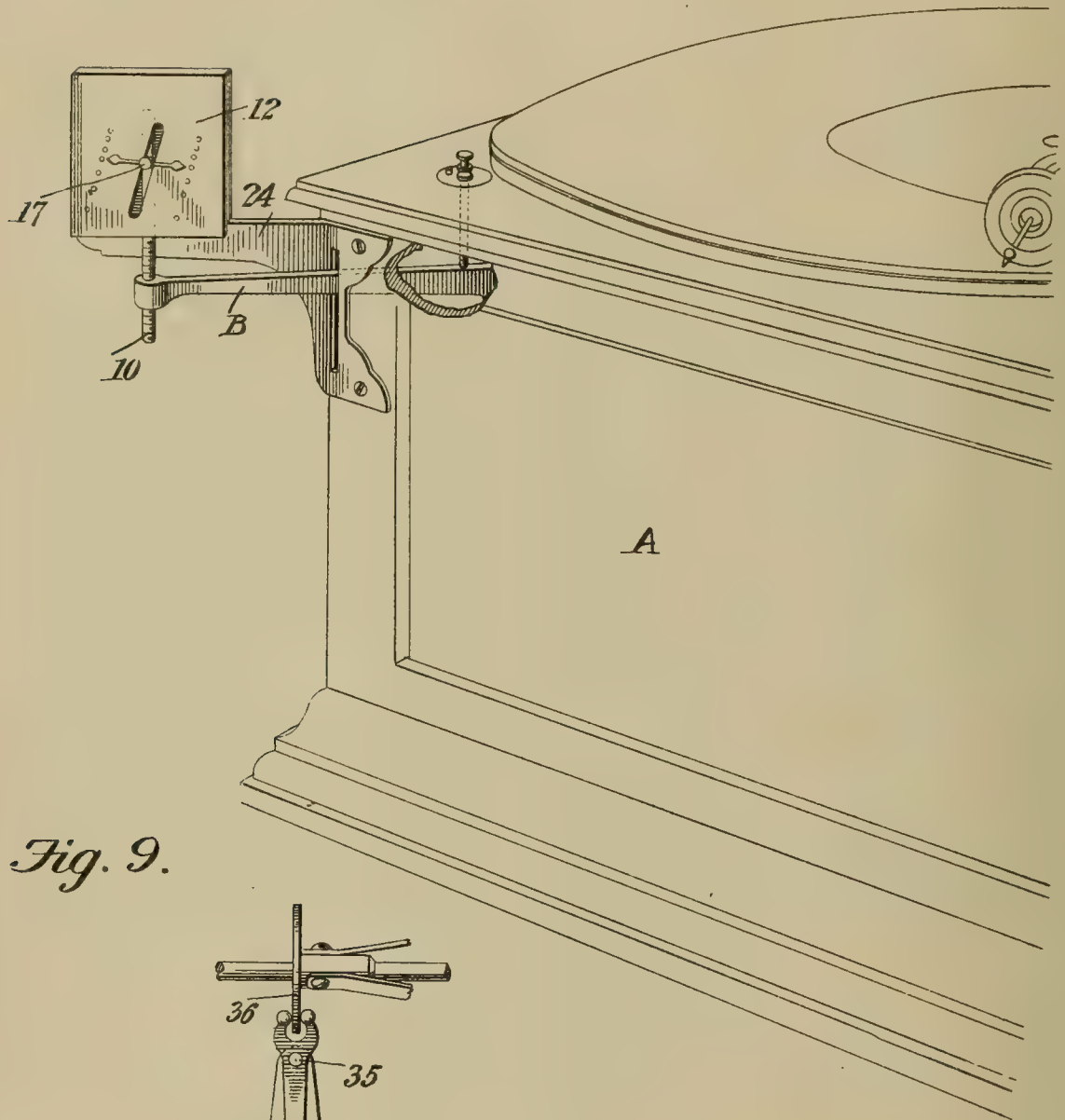
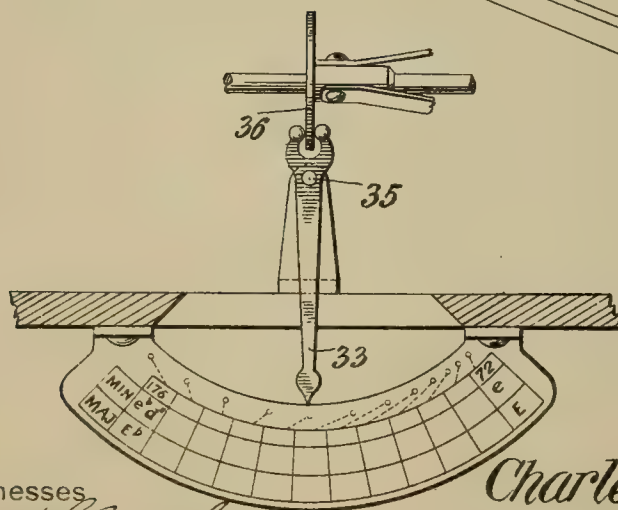


Fig. 9.



Witnesses

E. J. Stewart
John E. Parker

Charles L. Chisholm Inventor

by *C. A. Snow & Co.*
Attorneys

No. 814,941.

PATENTED MAR. 13, 1906.

C. L. CHISHOLM.

PITCH INDICATING ATTACHMENT FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED AUG. 8, 1905.

5 SHEETS—SHEET 4.

Fig. 6.

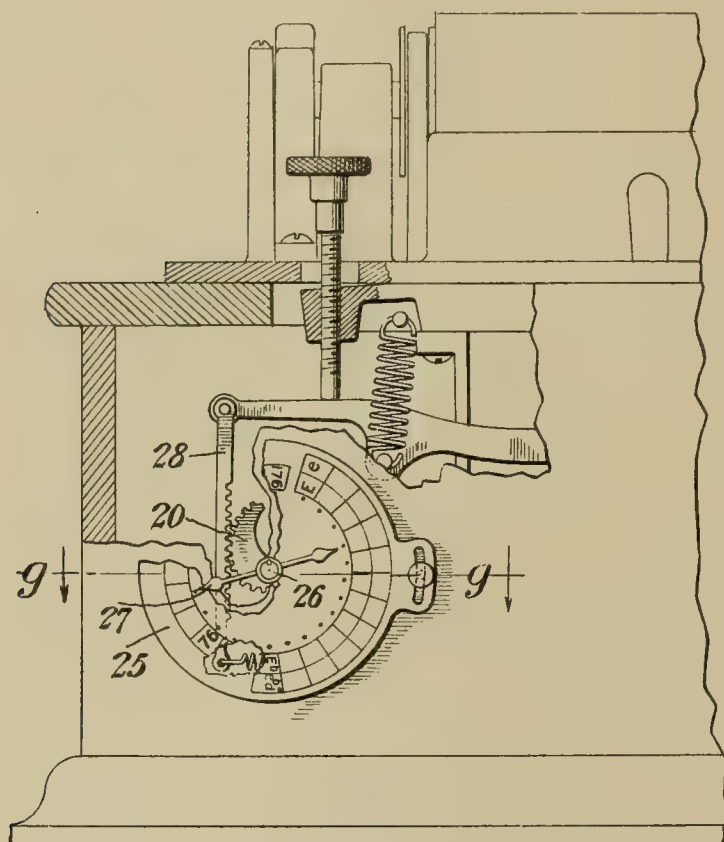
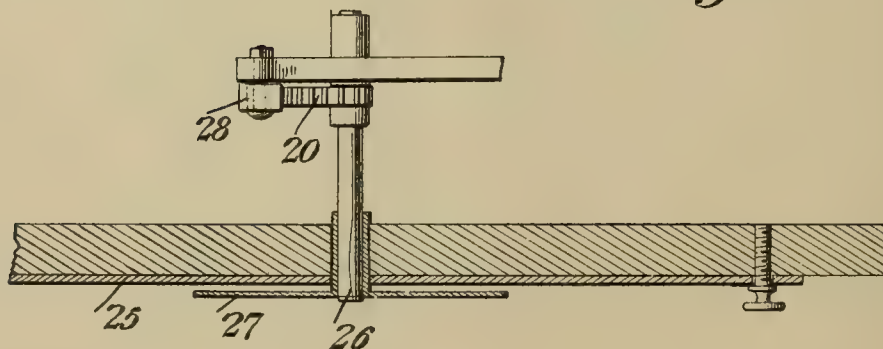


Fig. 7.



Witnesses

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No. 814,941.

PATENTED MAR. 13, 1906.

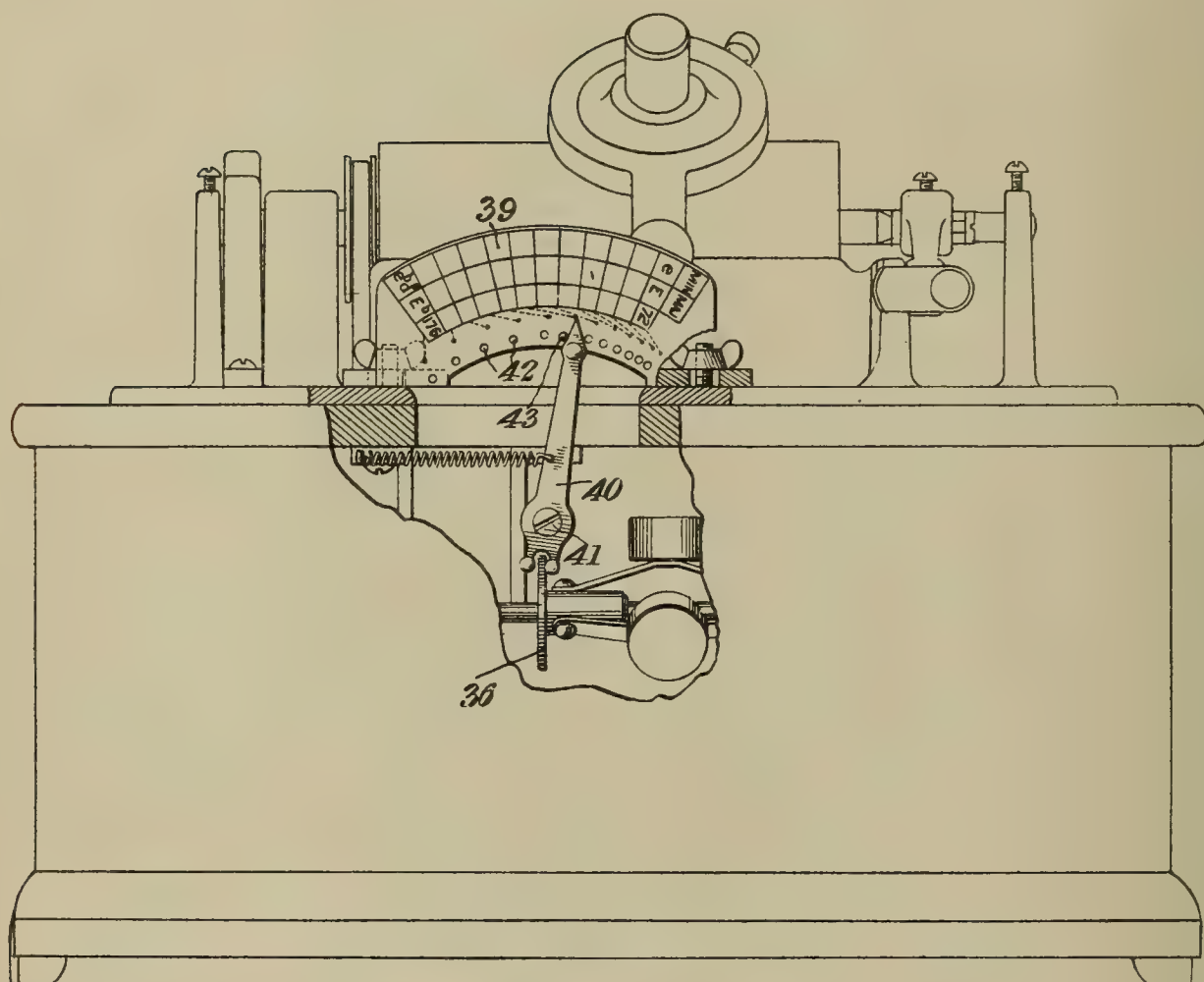
C. L. CHISHOLM.

PITCH INDICATING ATTACHMENT FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED AUG. 8, 1905.

5 SHEETS—SHEET 5

Fig. 10.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES L. CHISHOLM, OF NORTH SYDNEY, CANADA.

PITCH-INDICATING ATTACHMENT FOR SOUND-REPRODUCING MACHINES.

No. 814,941.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed August 8, 1905. Serial No. 273,266.

To all whom it may concern:

Be it known that I, CHARLES L. CHISHOLM, a subject of the King of Great Britain, residing at North Sydney, Cape Breton, Canada, have invented a new and useful Pitch-Indicating Attachment for Sound-Reproducing Machines, of which the following is a specification.

The principal object of the present invention is to provide an improved means whereby phonographs, graphophones, and other sound-reproducing machines may be utilized in the teaching of music, and particularly in teaching absolute pitch.

A further object of the invention is to provide an improved form of indicating device in the nature of an attachment which may be made and sold as a separate article of manufacture and applied to existing sound-reproducing machines or which may be constructed as part of a machine during the manufacture of the latter.

A still further object of the invention is to provide for the adjustment of the indicating means in accordance with the pitch and tempo at which a record is made, so that in reproducing the record the speed of the machine may be adjusted until the selection is being reproduced at the pitch and tempo of recording, after which the indicating means may be adjusted until the key-symbol of reproduction is in correct position. The speed of the machine may then be increased or diminished, each movement effecting a simultaneous adjustment of the indicator and the latter showing the new key of reproduction, it being possible to produce any composition in every possible key in true relation to the tonal center and to indicate the correct key of reproduction, so that the pupil may readily follow the selection on the charts previously referred to, a separate chart being prepared for each key.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is

a front elevation illustrating a portion of a phonograph and showing the application thereto of an indicating device constructed and arranged in accordance with the invention. Fig. 2 is a detail elevation of the indicating devices on an enlarged scale. Fig. 3 is a vertical section of the same on the line *c c* of Fig. 2. Fig. 4 is a sectional plan view on the line *d d* of Fig. 3. Fig. 5 is a detail perspective view illustrating the application of the device to a gramophone. Fig. 6 is an elevation illustrating a modification of the mechanism, the indicating-dial in this instance being circular in form. Fig. 7 is a sectional view of the same on the line *g g* of Fig. 6. Fig. 8 illustrates a modification of the invention in which the controlling-lever moves directly over an indicating-table. Fig. 9 illustrates a still further modification in which the indicating mechanism is operated directly from the motor. Fig. 10 illustrates a still further modification of the invention.

Similar characters of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

It is well known that in sound-reproducing machines the alteration of the speed of movement of the record will change the pitch and tempo of reproduction, and in practically all machines now on the market means are provided for controlling the speed of the record-carrier so that the operator may adjust the speed in accordance with the speed at which the record was originally made. This, however, is a matter of considerable difficulty, especially for the untrained ear, and it has been proposed to remedy this difficulty by marking on each record the speed of recording and to employ on each reproducing-machine a speed-indicator which may be adjusted in accordance with the speed marked on the record before the reproduction is made. The present invention is not intended merely for the purpose of insuring a correct reproduction in the pitch and tempo at which each selection is recorded, no matter how vital it may be to the correct interpretation of that record's composition, but is intended to first locate a tonal center from which to gravitate to both extremes of the instrument's compass and for permitting reproduction of the composition in every possible key at absolute concert-pitch in every instance.

In the drawings, A designates a portion of a sound-reproducing machine of any desired

type, said machine having a speed-controlling device, including a movable member B. To this movable member is secured a rod 10, carrying a double pointer 11, that is movable
 5 over a suitable dial or table 12, having two parallel rows of graduations 13 and 14. The graduations 13 are distinguishably designated by the symbols used in musical notation, starting in the present instance from E \flat ,
 10 and the second line of graduations 14 is provided with numerals indicating the metronome-tempe, according to Maelzel. It is preferred also to employ two series of key-notes arranged side by side, one in the major and
 15 the other in the minor scale, representing all key-signatures.

The dial or table is carried, in the construction shown in Figs. 1 and 2, by a vertically-arranged standard 15, having an adjusting-screw 16, by means of which the dial or table
 20 may be adjusted in accordance with any given position of the pointer, as will hereinafter appear; but the same result may be accomplished by making the pointer adjustable on its carrying-rod and providing a set-screw 17 for locking said pointer after adjustment or in case of a revoluble pointer moving
 25 over a circular dial. Either the dial or the pointer may be made adjustable. Before describing further the adjustability of the dial or table, which in some instances is unnecessary, it may be assumed that all records are originally made on a machine rotating at a given speed—such a speed, for instance,
 30 as would indicate middle C on the dial or table, this being the international concert-pitch for modern music, whether vocal or instrumental. The record so made is delivered to the pupil, who is provided with a
 35 machine having the same indicating mechanism and preferably of precisely the same construction as the recording-machine or in the case of a gramophone arranged for a given speed of reproduction to a known speed
 40 of recording. The pupil having first adjusted his speed-regulating mechanism until the pointer is in alinement with the symbol "C," places the record on the carrier and starts the machine. The reproduction which follows is
 45 in the pitch and time at which the record was made, and being in absolute concert-pitch the pupil may follow the sound reproduction on a specially-prepared chart written in the key of C, and thus become familiar through
 50 constant repetition with the notation and expression. The pupil is provided with fifteen different charts each having a different key-signature in accordance with the symbols on the dial or table, and the composition
 55 may be reproduced by means of one record in absolute pitch in any key by adjusting the speed-regulator until the pointer is opposite a symbol representing the desired key. In this manner absolute pitch may be taught
 60 the pupil in the most thorough manner, and

the device thus become of the utmost value and importance to persons remote from musical centers. With a device of this character the musical possibilities of key relationship, including the enharmonic changes of
 70 key, may be fully illustrated, all changes agreeing with standard concert-pitch, and, further, every key is indicated by the pointer on the dial, and at the same time the pointer indicates the metronome-tempe of that key,
 75 thereby fixing a standard of time measurement for each individual key. The table or dial is arranged in accordance with the effect produced from the varying speed of the machine to represent the absolute pitch of any
 80 chromatic interval. The key-note is fixed in all changes regardless of time, and thus insures correct intonation from any fixed center, in the present instance middle C, at standard concert-pitch. As a further exam-
 85 ple of the advantages to be gained from an attachment of this character it may be desired, for example, to record a hymn in G and for the machine to lead a choir or chorus through some famous voice. If during re-
 90 cording with the pointer opposite "G" of the dial or table the rendition is too slow, the speed-controlling mechanism is adjusted until the pointer is opposite "D \flat " or any key higher than G that will give the best tempo,
 95 then record in G with the pointer opposite "D \flat ," and the hymn will be reproduced at absolute pitch in G. This record could be reproduced on any machine at a distant point in G, standard concert-pitch, and the choir
 100 and organ scores could be read in the original key—i. e., G—and at original tempo of recording, the record bearing on the margin the key and metronome figures of speed at recording—i. e., "G-152."
 105

If the indicating mechanism is placed on machines of precisely the same construction and all records are made at precisely the same speed, there is no necessity for adjustment for different speeds. It is usual, how-
 110 ever, to regulate the speed of recording in accordance with the length of the selection, so that for a long selection the record will be moved at a slow speed and for a short selection the record will be moved at a high-speed,
 115 the object in both cases being to secure a record which extends practically from end to end of the cylinder or from the periphery to a given point near the center of a disk record of the gramophone type. The machines also
 120 vary in size, and from imperfections in the spring or other motor, wear of the parts, or accumulations of dust in the driving devices the speed of machines of the same make, adjusted in precisely the same manner, will
 125 vary to a considerable extent. To overcome this objection, which is a practical difficulty naturally found where the attachment is designed for use in connection with different makes of machines, it is desirable to provide
 130

means for adjusting either the dial or the pointer in order that a preliminary adjustment of a given tonal center may first be secured, a tuning-fork being generally employed to assist in this adjustment. The necessary adjustment may be secured by turning the screw 16 in one direction or the other to raise or lower the table, or by loosening the set-screw 17 the pointer may be adjusted and then locked in proper position. The proper adjustment having been secured in absolute pitch, the variations both below and above the tonal center C may then be secured in the manner previously described and the record reproduced in all keys with the same regard to concert-pitch at each change of key.

In the construction shown in Fig. 5 the device is shown as applied to the gramophone type of sound-reproducing machines. In this case the table or dial is supported by a suitable bracket 24 and the operating arm or lever of the speed-controller is extended through a slot in the casing of the machine.

In Fig. 6 is illustrated a further modification of the dial and indicating mechanism. In this case the dial 25 is circular in form and is provided with equidistant graduations bearing the key-symbols. At the center of the dial is an arbor 26, on which is mounted a hand or pointer 20, and at the rear end of the arbor, which extends through the casing of the machine, is secured a cam-shaped gear 27, with which engages a rack 28, carried by the speed-controlling lever of the machine. As the speed-controlling lever is moved up and down the movement is transmitted through the rack and gear to the pointer, and the latter in revolving will correctly indicate the pitch of reproduction. By employing the cam-shaped gear all of the graduations on the dial may be made equidistant as distinguished from the graduations on the dial shown in Fig. 2. In the latter case it is necessary to make the graduations smaller as the speed of the machine is reduced, for the reason that slight variations in reduction of the speed result in considerable variation in pitch, while for increase in speed a greater movement of the lever is necessary to effect corresponding variations in pitch. By the employment of the gearing shown this variation in movement may be compensated for and the graduations may be uniform. In the construction shown in Fig. 6 the dial is circumferentially adjustable in order to secure the adjustment of the tonal center previously described, and the pointer is held by friction on its arbor, so that said pointer may also be adjusted.

In Fig. 8 is illustrated a further modification wherein the dial or table is in the form of a segmental bar or strip 30, bearing graduations and provided with the key-indicating symbols. In alinement with each graduation is a notch 31, and the several notches are

designed to receive the end of the speed-controlling member, the latter being sprung into any one or other of the notches and being manipulated by hand in order to control the speed, thus dispensing with the screw-adjustment and permitting more ready changing of the speed of the instrument.

In Fig. 9 is illustrated a further modification wherein the pitch-indicating device is operated directly from the motor instead of from the speed-adjusting device. In this case the dial or table is arranged at a slight angle to the horizontal and disposed in front of the machine. Over the table travels a pointer 33, mounted on a pivot-pin 35 and bifurcated at its rear end in order to embrace a disk 36, that is moved to and fro with the governor as the speed of the machine varies. This longitudinal movement of the disk on the governor-shaft serves to move the pointer and correctly indicate the pitch of reproduction.

In Fig. 10 is illustrated a still further modification of the invention. In this instance the disk 36 is engaged by the lower end of a vertically-disposed lever 40, pivoted on a pin 41, that is carried by the hinged cover of the casing. The upper end of this lever is adapted to travel over a dial 39, bearing the pitch-indicating symbols. The dial in this instance is in the form of a bar having openings 42 arranged at the different graduations. These openings are arranged for the reception of a stop-pin 43, which may be adjusted into any one of the openings in order to form a stop for the lever, and by moving said lever until its upper end is opposite any one of the graduations the disk may be adjusted to control the operation of the machine at the speed desired. Movement of the upper end of the lever to the extreme right will by friction on the disk 36 cause the complete stoppage of the motor, so that the lever acts as a stopping, starting, speed controlling and indicating means.

It is obvious that the indicating means may be operated from any part of the machine and connected to any of the movable parts thereof without departing from the invention.

Having thus described the invention, what is claimed is—

1. In apparatus of the class described, a table bearing in parallel columns the pitch-indicating symbols of musical notation, a metronome time-indicating scale, a double pointer movable between said columns to indicate the pitch and tempo of reproduction, and a speed-controlling mechanism connected to said pointer.

2. In apparatus of the class described, a dial or table bearing pitch-indicating symbols, and a metronome time-indicating scale, the face of said table being provided with a slot, a standard, an adjusting-screw carried

by the standard and forming a suspension means for said table, a double pointer, a pointer-support extending through the slot, a rod carrying the pointer-support, and
5 means connecting said rod to the speed-controlling mechanism of the machine.

3. In apparatus of the class described, a table for indicating the different keys in which a reproduction is made, said table being adjustable to the end that a given graduation of the table will correspond to the pitch or key in which the record is made, and means connected to the speed-controlling mechanism for indicating on said table the absolute
10 pitch of reproduction both above and below the pitch of recording.

4. An indicating attachment for a phonograph or like machine, having a speed-con-

trolling mechanism, said indicating means comprising a table or dial having graduations designated by the characters employed in musical notation, a pointer movable over the table and under the control of the speed-controlling mechanism, and a means for effecting adjustment of the table with relation to the pointer, whereby said table may be adjusted in accordance with the pitch and tempo of the reproduction. 20 25

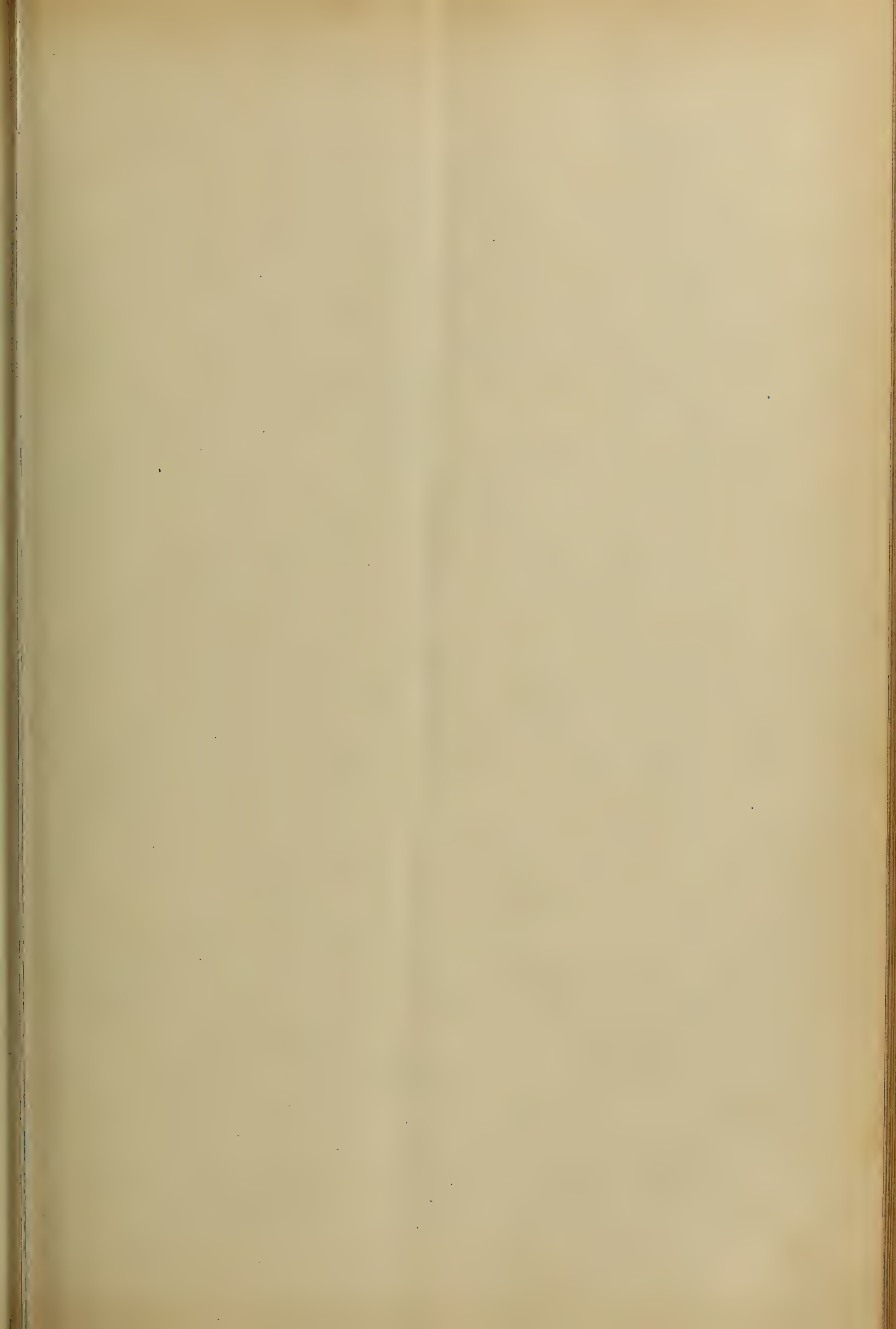
In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses. 30

CHARLES L. CHISHOLM.

Witnesses:

J. H. JOCHUM, Jr..

M. O. AUERBACH.

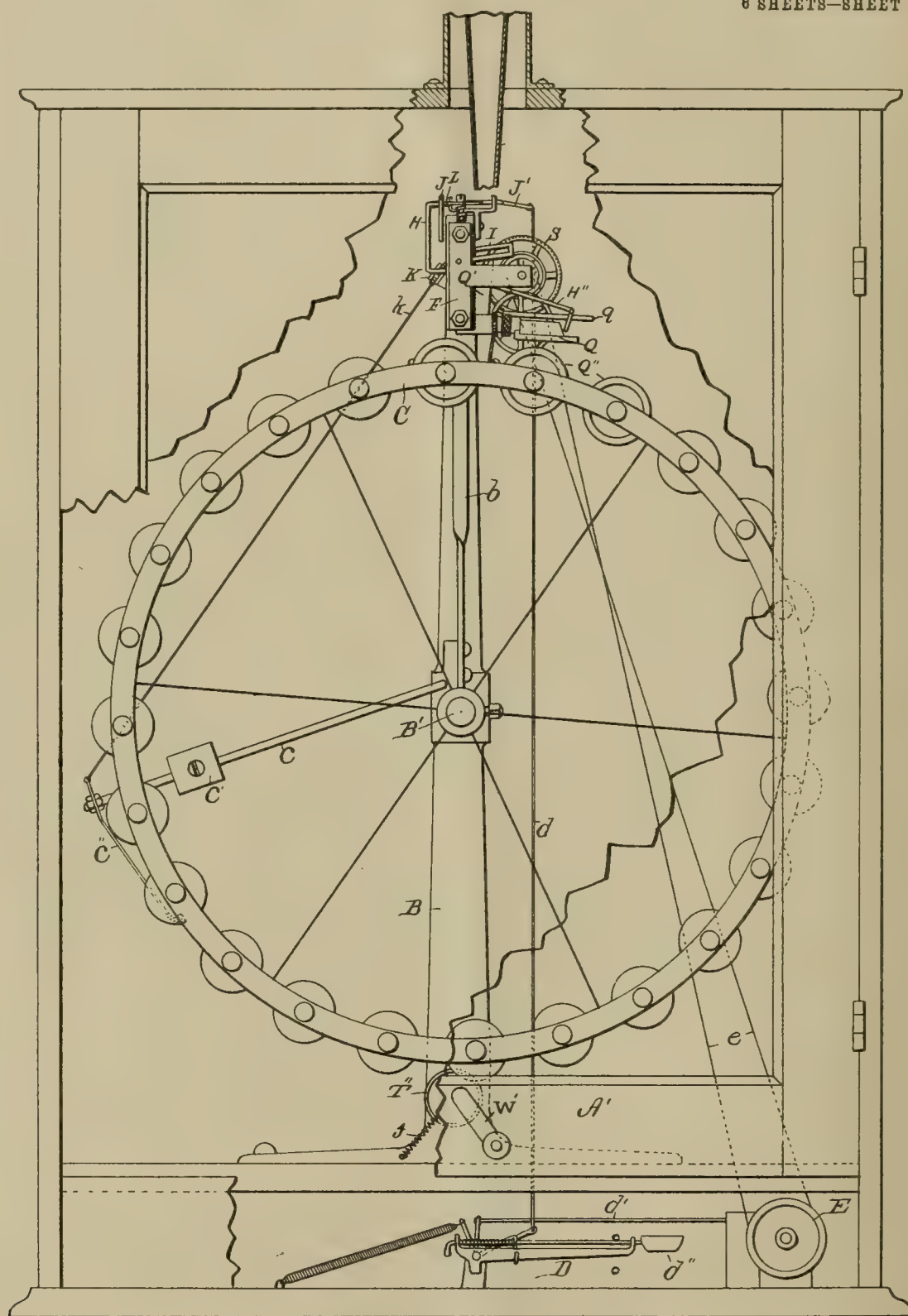


No. 816,608.

PATENTED APR. 3, 1906.

C. C. SHIGLEY.
MAGAZINE PHONOGRAPH.
APPLICATION FILED OCT. 26, 1904.

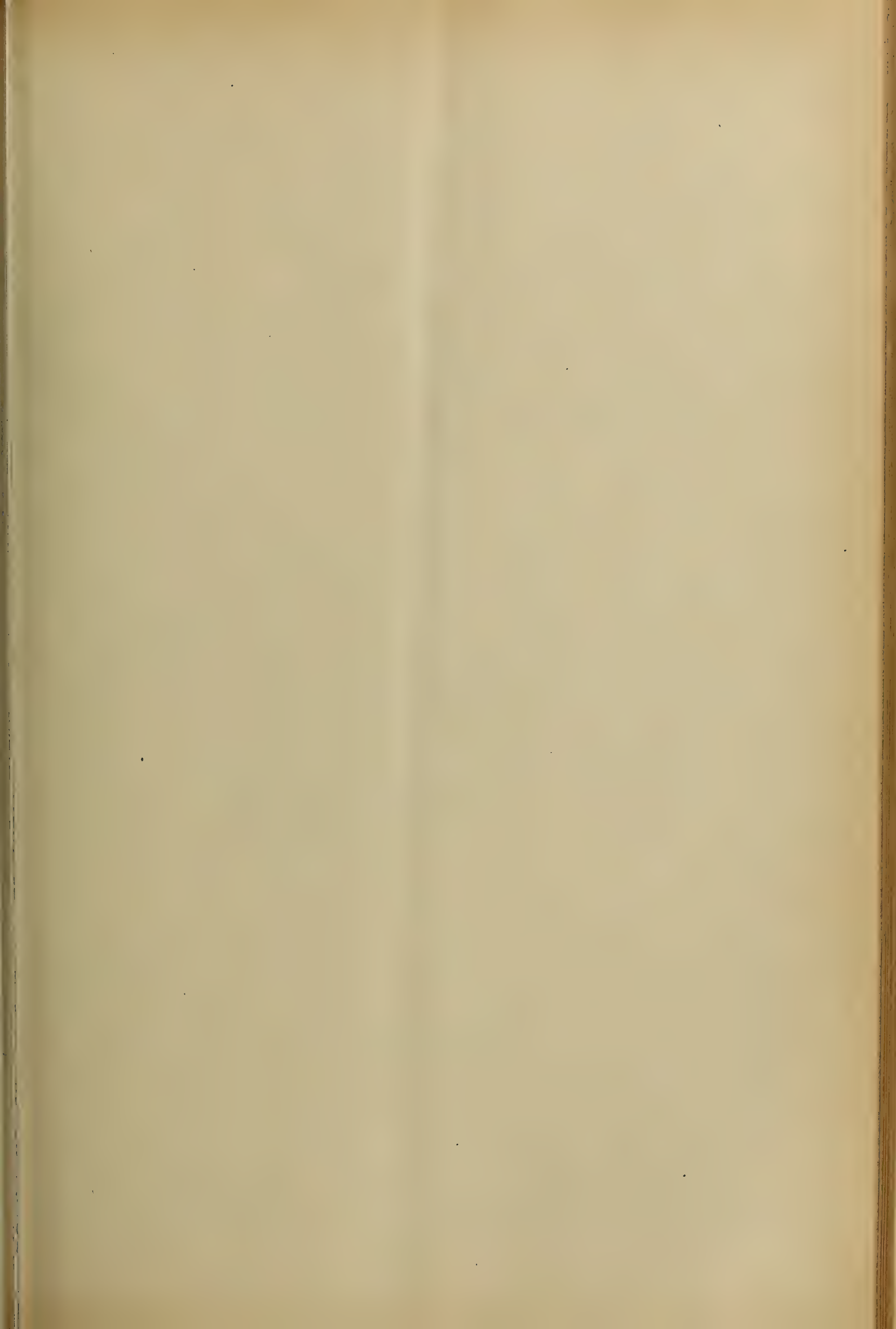
6 SHEETS—SHEET 1.



Witnesses:
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Fig 1

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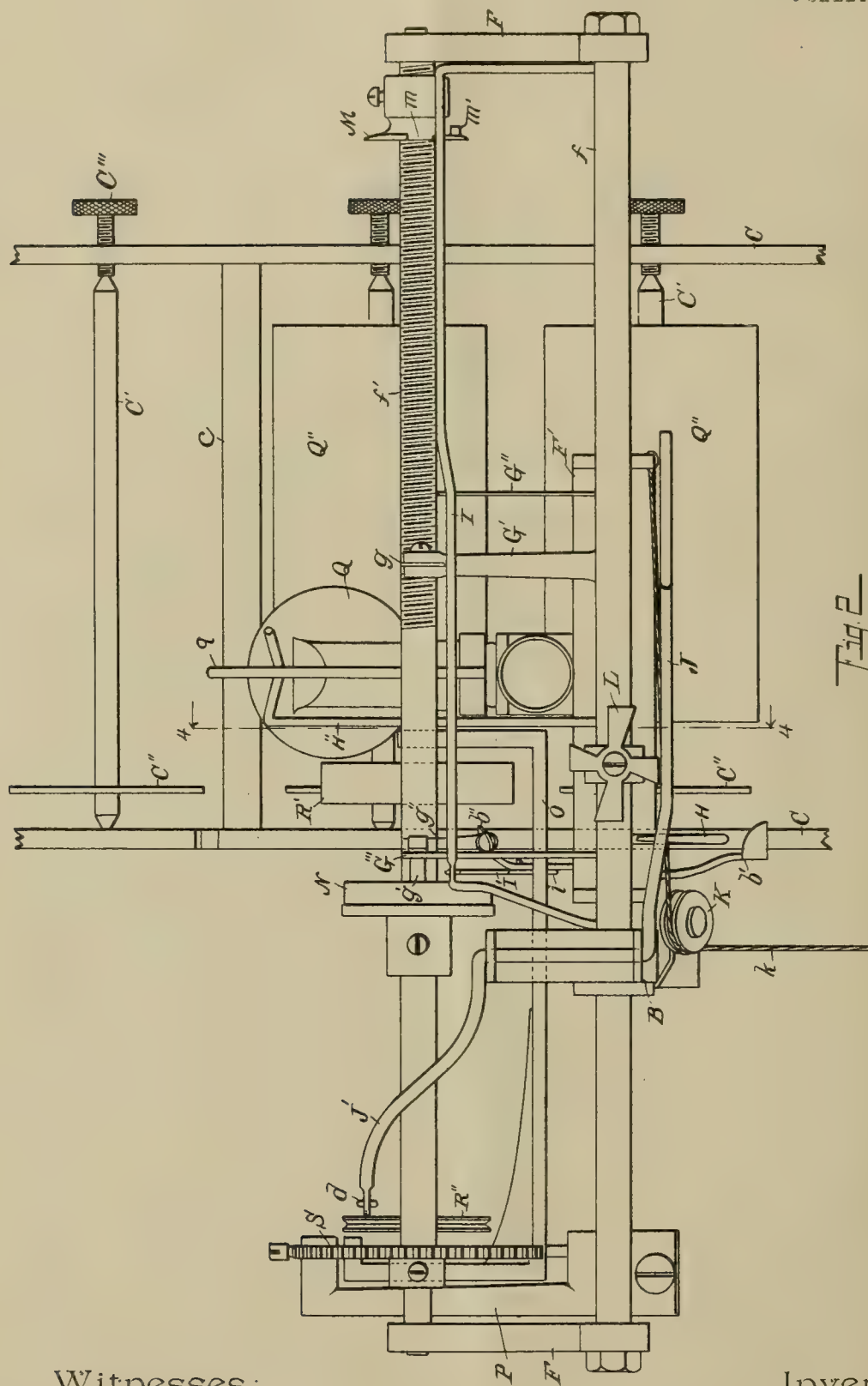


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6 SHEETS—SHEET 2.

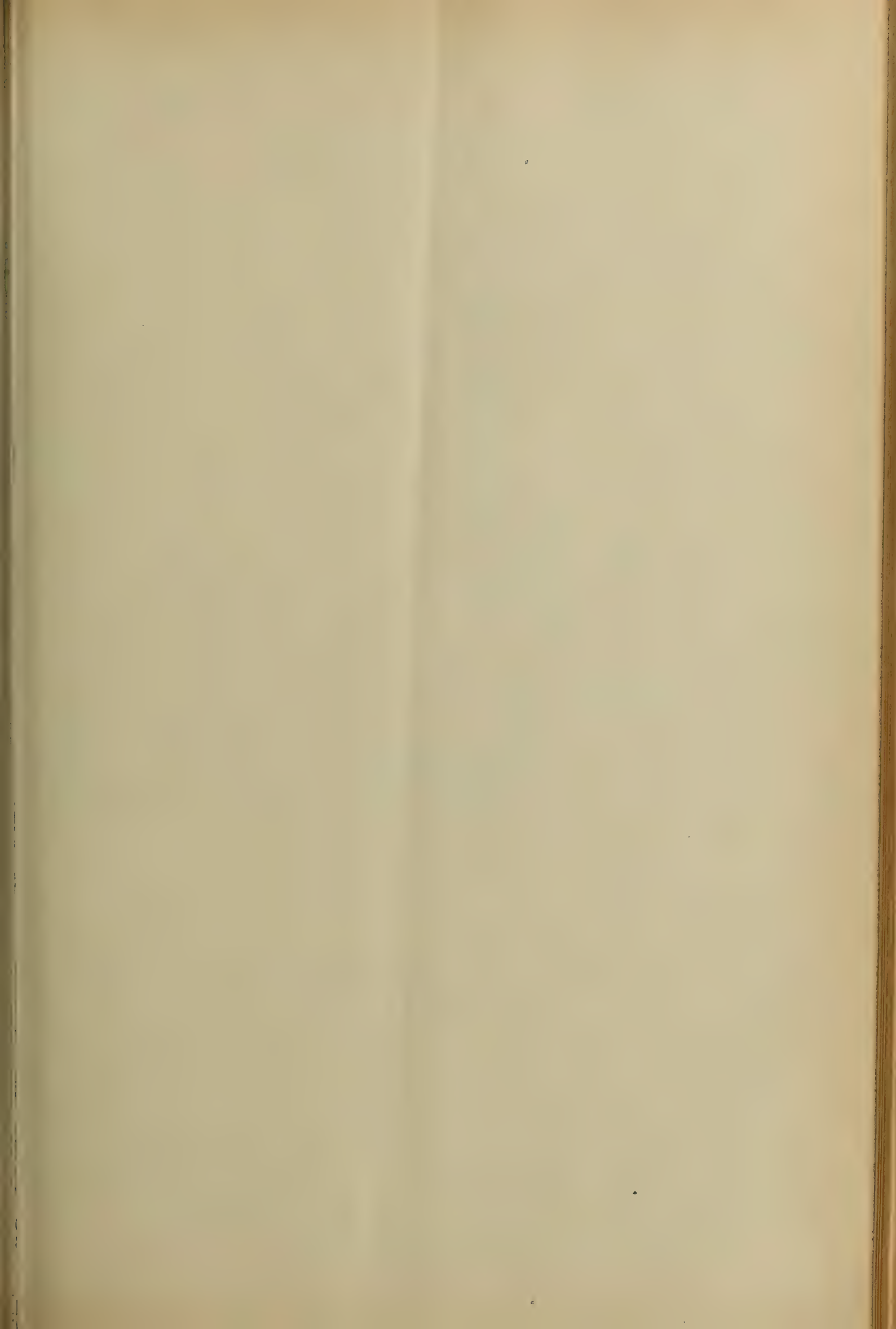


Witnesses:

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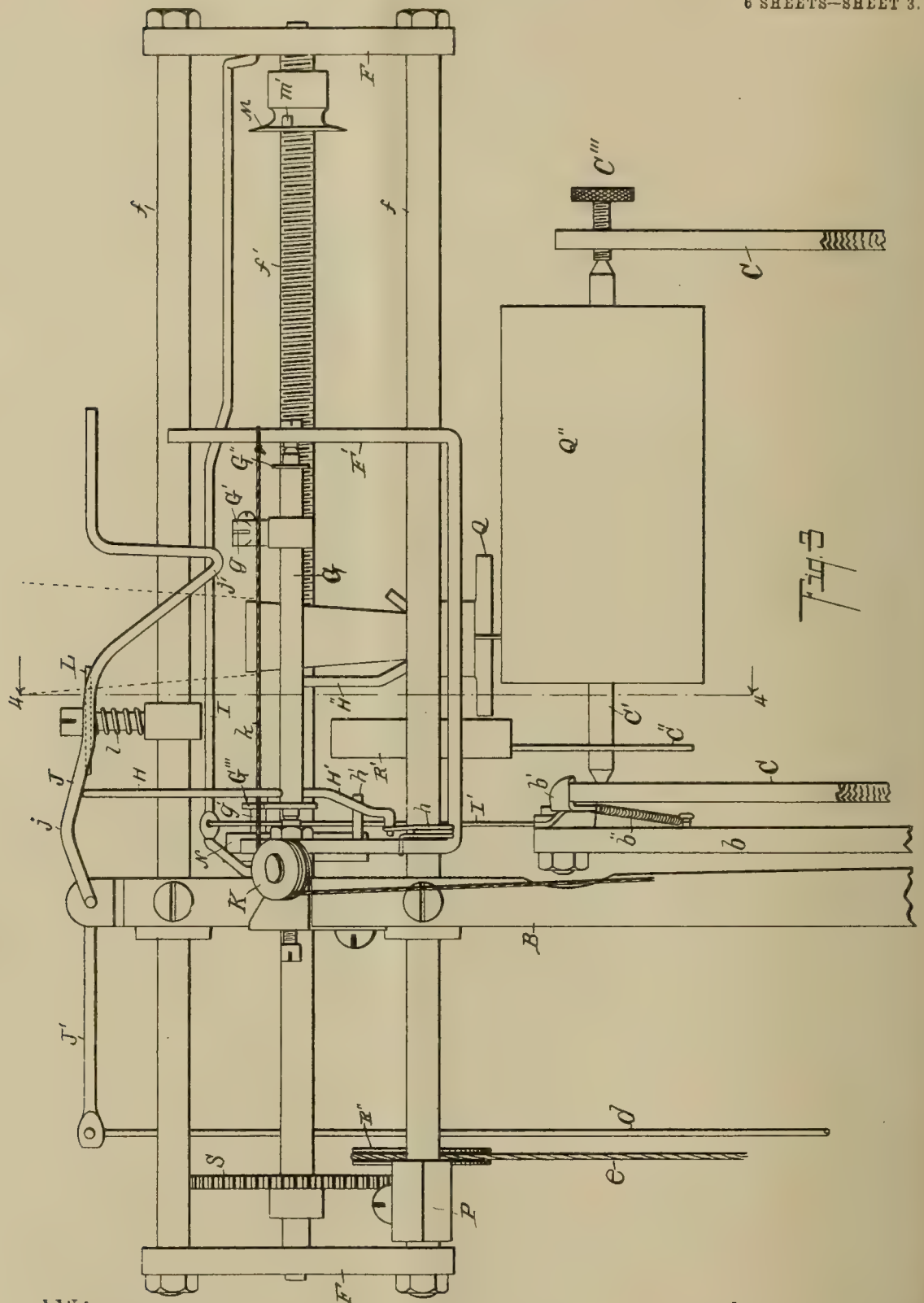
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MAGAZINE PHONOGRAPH.
APPLICATION FILED OCT. 26, 1904.

6 SHEETS—SHEET 3.



Witnesses:

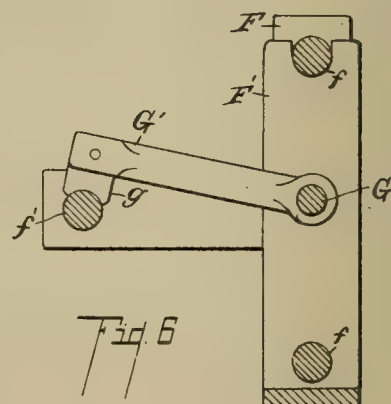
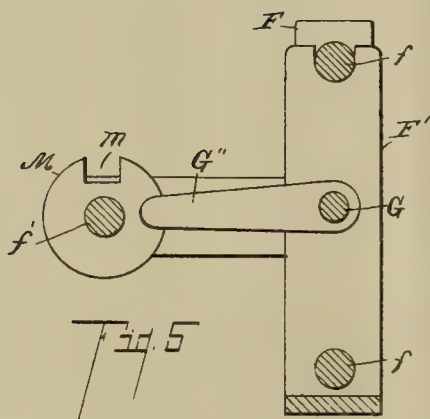
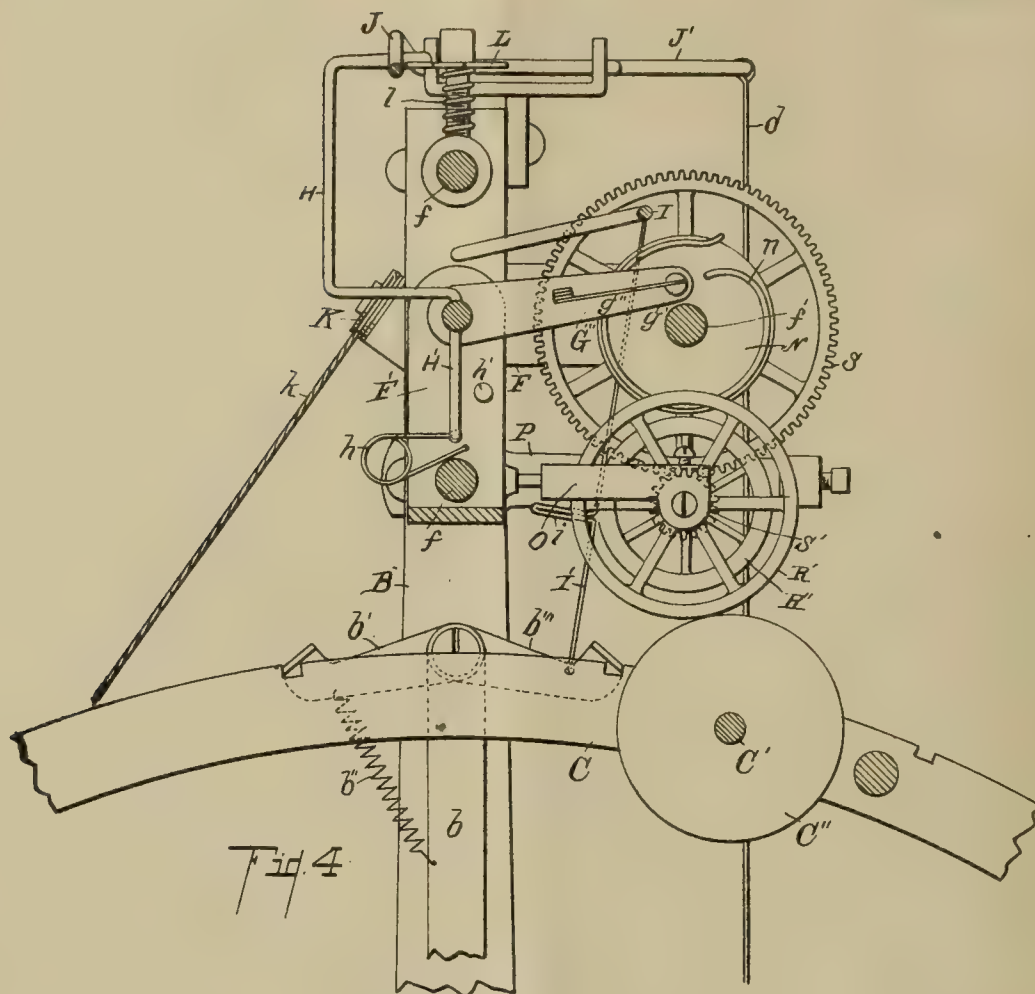
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C. C. SHIGLEY.
MAGAZINE PHONOGRAPH.
APPLICATION FILED OCT. 28, 1904.

6 SHEETS—SHEET 4.



Witnesses:

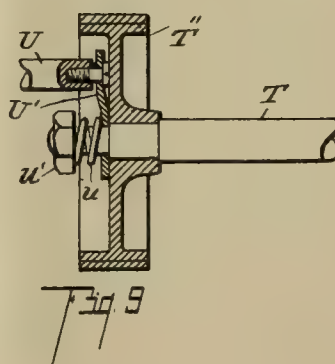
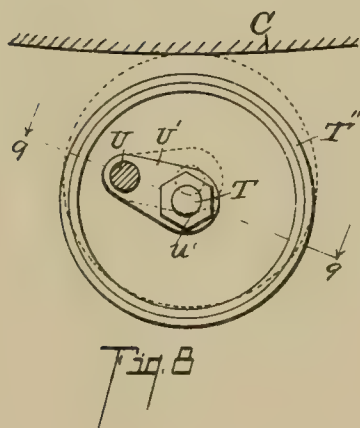
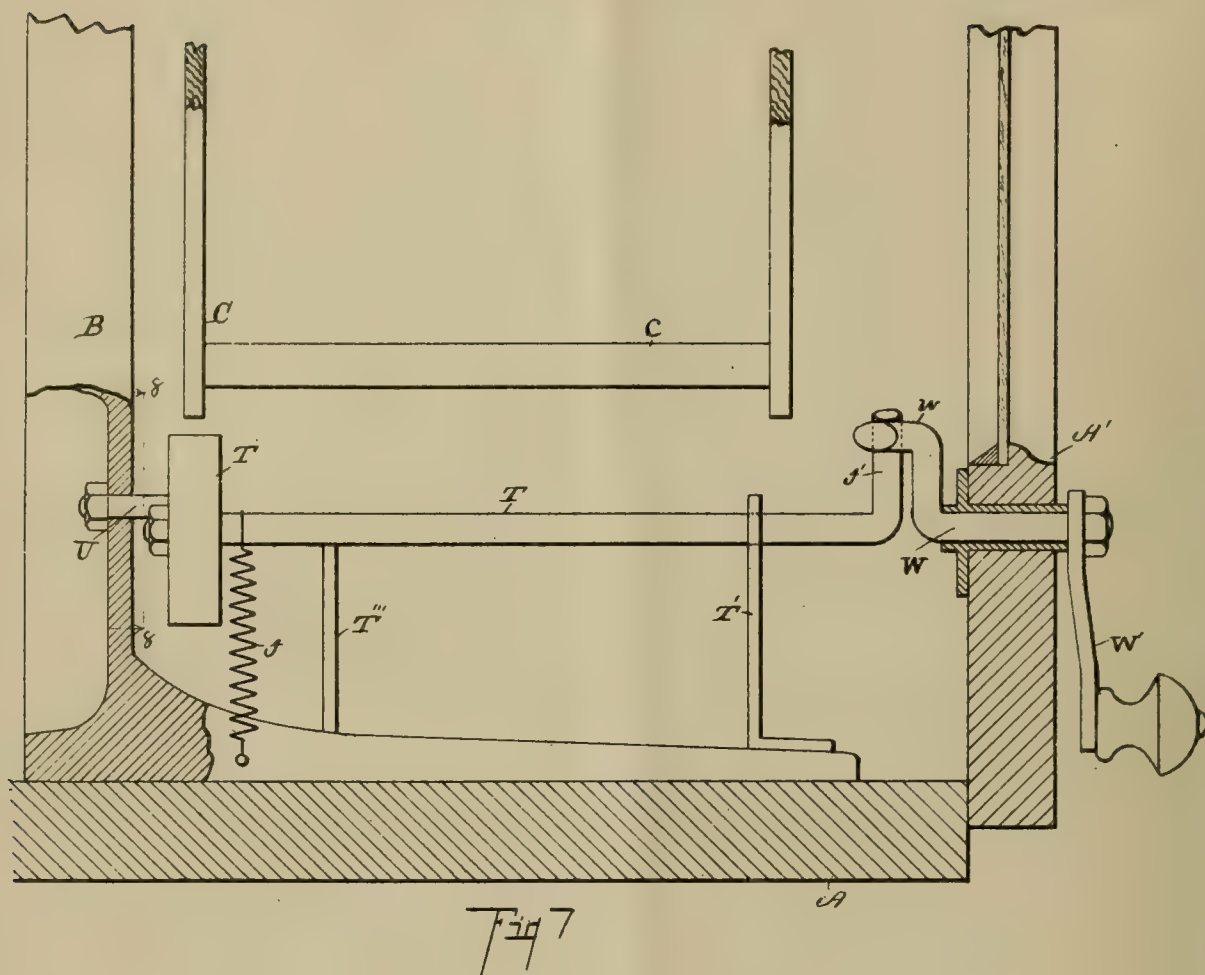
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MAGAZINE PHONOGRAPH.
APPLICATION FILED OCT. 28, 1904.

6 SHEETS—SHEET 5.



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No. 816,608.

PATENTED APR. 3, 1906.

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MAGAZINE PHONOGRAPH.
APPLICATION FILED OCT. 26, 1904.

6 SHEETS—SHEET 6.

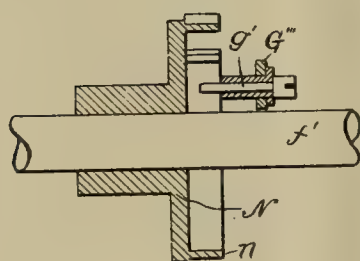
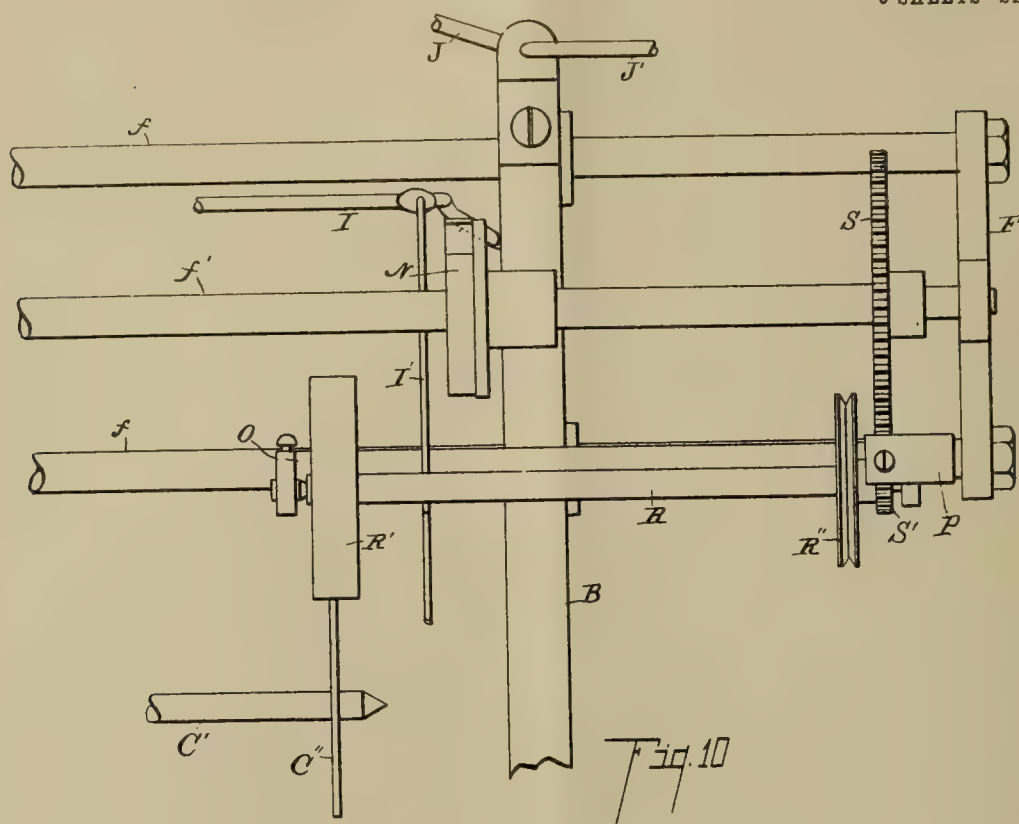


Fig. 11

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UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY, OF HART, MICHIGAN.

MAGAZINE-PHONOGRAPH.

No. 816,608.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed October 26, 1904. Serial No. 230,076.

To all whom it may concern:

Be it known that I, CYRUS C. SHIGLEY, a citizen of the United States, residing at the village of Hart, county of Oceana, State of Michigan, have invented certain new and useful Improvements in Magazine-Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs.

10 It relates particularly to improvements in magazine-phonographs of the class illustrated and described in United States Letters Patent issued to me on May 5, 1903, No. 727,002, and No. 773,164, dated October 25, 15 1904, and the same is in some respects an improvement on the structures there shown, although it contains features adapted for use in other relations.

20 The objects of my invention are, first, to provide in a magazine-phonograph an improved means by which the record-rolls are automatically brought into position for the reproduction of the records and the reproducer automatically adjusted; second, to 25 provide in a magazine-phonograph an improved means by which any desired record may be brought into position for reproduction or the several records reproduced successively, as desired; third, to provide in a 30 magazine-phonograph an improved means by which the reproducing mechanism is automatically thrown into and out of engagement with the record-rolls; fourth, to provide in a magazine-phonograph means by 35 which the record-magazine and the reproducer mechanism are actuated in proper relation to each other; fifth, to provide in a magazine-phonograph an improved means which may be readily adjusted so that two or 40 more records will be reproduced upon the introduction of a single coin; sixth, to provide in a magazine-phonograph means by which the bringing of the reproducer into engagement with the record-roll is timed so that the 45 vibrations due to the adjustment of the magazine have practically ceased; seventh, to provide in a magazine-phonograph an improved means for throwing the reproducer into and out of engagement with the record-roll. 50

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

55 I accomplish the objects of my invention by the devices and means described in the following specification,

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of my improved phonograph, portions of the casing being broken away and portions being shown 65 in section to show the arrangement of the parts. Fig. 2 is an enlarged detail plan view of the mechanism removed from the casing. Fig. 3 is a detail elevation view looking from the right of Fig. 2. Fig. 4 is a transverse 70 sectional view taken on a line corresponding to line 4 4 of Figs. 2 and 3. Fig. 5 is an enlarged sectional view through the reproducer-carriage, showing the means of throwing the reproducer out of engagement with the record-roll and checking the carriage. Fig. 6 is 75 a transverse sectional view through the reproducer-carriage, showing the means for driving the same. Fig. 7 is an enlarged detail transverse sectional view through the casing, 80 showing the mechanism for adjusting the mechanism by hand. Fig. 8 is an enlarged detail sectional view taken on a line corresponding to line 8 8 of Fig. 7. Fig. 9 is a sectional view taken on a line corresponding to 85 line 9 9 of Fig. 8. Fig. 10 is an enlarged detail elevation view showing the arrangement of the driving means for the record-rolls and of the trip-wheel N for throwing the reproducer into engagement with the record-roll 90 and connecting the carriage with the driving-shaft. Fig. 11 is an enlarged sectional view through the wheel N for throwing the reproducer into engagement with the record-roll and connecting the carriage with the driving- 95 shaft.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar 100 parts throughout the several views.

Referring to the drawings, the casing A is of any desired form and material and is preferably suitably glazed, so that the mechanism is visible to the operator. The casing is 105 provided with a door A'. A standard B, by which the operative parts of the machine are supported, is arranged within the casing, preferably at the rear thereof. The record-rolls are supported by a wheel consisting of 110 a pair of rims C, which are rigidly secured together by suitable cross-pieces c'. The

spokes are secured to these cross-pieces c' . The hub is preferably provided with suitable antifriction-bearings. One of the rims is provided with suitable pivot-sockets in its inner face for the inner ends of the mandrel-shafts C' , which are provided with pivot-bearings. Thumb-screws C''' , having suitable bearing-sockets in their inner ends, are inserted through the opposite rim to form bearings for the outer ends of the mandrel-shafts C' . This enables the ready removal or insertion of the record-rolls and the accurate adjustment of the bearings therefor. The record-rolls are thus supported so that they revolve freely and at the same time are held steadily in position. By this arrangement I am enabled to support in a comparatively compact space a large number of record-rolls, as Q'' , so that they may be readily brought into proper relations to the reproducer mechanism as desired. The means by which this is accomplished will be hereinafter pointed out.

On each of the mandrel-shafts C' is a thin-rimmed wheel C'' . These wheels C'' as the magazine-wheel is revolved to bring the record-rolls into proper relation with the reproducer mechanism are engaged in turn by the friction driving-wheel R' . (See Figs. 3 and 4.) This driving-wheel R' is preferably provided with a soft-rubber tire, as is illustrated in my first patent heretofore referred to. The driving-wheel R' is mounted on the shaft R . This shaft R is provided with a grooved pulley R'' , which is connected to the motor E , which is shown in conventional form in Fig. 1, by the belt e . The shaft R is mounted in suitable bearings on the frame O . This frame O is pivoted at its outer end to the bracket P . (See Figs. 2 and 4.) This allows the friction-wheel R' to swing up and down, permitting the mandrel-shaft wheel C'' to pass under the same and allowing it to be held out of the engaging position when the machine is being adjusted, as will be hereinafter described. The shaft R is provided with a pinion S' , which meshes with the gear S on the screw driving-shaft for the reproducer-carriage. This mechanism is substantially that described in my first patent heretofore referred to.

The bracket P is secured to the supporting-frame for the reproducing mechanism. This frame consists of the rods f and the T-shaped end brackets F , which are secured thereto. The rods f are arranged in the upper end of the standard B . The driving screw-shaft f' is arranged in suitable bearings in the end brackets F . The rods f are arranged parallel and serve as ways or bearings for the reproducer-carriage F' , which is provided with suitable bearings, so that it is adapted to reciprocate back and forth on the rods. (See Figs. 1 to 6.)

It is desirable that the reproducer mechanism be automatic in its operation in relation

to the record-rolls, so that it is only necessary to start the mechanism to have any desired record reproduced and the mechanism automatically readjusted for the next reproduction. To accomplish this, the reproducer Q is pivotally supported on the carriage F' . The carriage F' is driven in one direction by the screw-shaft f' . The driving connections for the screw-shaft f' have been heretofore described.

A rock-shaft G is carried by the carriage F' . On this rock-shaft is an arm G' , having a blade g adapted to engage the threads of the driving-shaft f' , so that as the shaft is revolved the carriage is driven along thereby. The carriage is returned to its initial position by the weighted lever c , which is connected thereto by a suitable cord k . The cord k is arranged on the pulley K , as clearly appears from the drawings. The lever c is pivoted on the standard B and is provided with a suitable weight c' . The lever c is provided with a spring-pawl c'' at its outer end adapted to engage suitable notches on the periphery of one of the rims of the magazine-wheel. These notches are spaced, one to each record-roll carried by the magazine-wheel, so that upon each actuation of the lever c the magazine-wheel is advanced one step to bring the next succeeding record-roll into proper position for reproduction. The magazine-wheel is provided with a suitable stop or escapement mechanism, which will be described later.

When the carriage is returned to its initial position for the reproduction of a record, the driving-arm G' thereof is automatically brought into engagement with the driving-shaft f' by means of the arm G''' , carried by the rock-shaft G . The arm G''' is provided with a laterally-projecting pin g' . (See Fig. 11.) This pin is arranged through the arm and is yieldingly held in position by a spring g'' . (See Fig. 4.) When the carriage reaches its initial position, this pin g' is engaged by the cam-shaped flange n of the wheel or disk N . (See Figs. 4 and 11.) This wheel N is carried by the driving-shaft f' . The flange n extends practically around the wheel and is deflected inwardly at its inner end, so that the rock-shaft G is thrown forward, thereby bringing the driving-arm G' into engagement with the driving-shaft and the reproducer into engagement with the record-roll. When the carriage reaches the end of its movement, the driving-arm G' is automatically thrown out of engagement with the driving-shaft by the disk M on the driving-shaft, which engages the arm G'' of the rock-shaft G . This arm G'' is a spring, and as the carriage is carried forward by the driving-shaft it engages the disk M and contacts with the inner face thereof until the notch m in the disk is reached, when the arm snaps through the notch and is engaged by the lug m' on the opposite side of the disk, which throws the arm

upward, thereby rocking the rock-shaft and lifting the driving-arm G' out of engagement with the shaft. The reproducer Q is lifted from the record-roll. At the same time the driving-arm is thrown out of engagement with the driving-shaft by a forwardly-projecting arm H'' on the rock-shaft G . The forward end of this arm is formed into a V shape to engage the forwardly-projecting rod or pin b , which is carried by the reproducer. It is apparent that when the rock-shaft is thrown down at the initial end of the carriage movement the reproducer is brought into contact with the record-roll, as heretofore stated.

The particular style of disengaging disk M is very economical to produce, which is the main advantage of the same over the structure of my former patents referred to herein. Another advantage is that there is no strain upon the carriage as it is carried forward upon the driving-screw until the same is disengaged, the spring-arm G'' yielding to allow this. It also avoids the necessity of accurate adjustment.

In order that the reproducer be brought into and thrown out of contact with the record-roll at the proper points, the disks M and N are adapted to be adjusted on the driving-shaft.

The rock-shaft G is retained in its adjusted positions by the spring h , one end of which is secured to the end of the downwardly-projecting arm H' on the rock-shaft and the other end of which rests upon one of the bearing-rods f . This spring holds the driving-rod G' into yielding engagement with the driving-shaft when the shaft G is rocked into that position and holds the same in its elevated position when the shaft is rocked to its opposite position. These parts clearly appear in Fig. 4.

When the rock-shaft G is operated by the disconnecting means, the upwardly-projecting arm H , carried by the rock-shaft G , is withdrawn from under the motor-controlling lever J , which allows the same to drop. The arm J' of this lever is connected to the motor by means of the rod d , so that the motor is stopped thereby.

The short arm J' of the lever J is, as above stated, connected by the rod or link d to the motor. The connection of the rod d to the motor is by means of a coin-controlled mechanism D , so that when a coin is introduced into the cup d'' the weight of the coin throws the cup downwardly and by means of the connecting-link d' starts the motor. This revolves the driving screw-shaft f' , and when the notch or slot m of the disengaging disk M reaches the spring-arm G'' it snaps through the same, thus freeing the carriage and allowing the same to return to its initial position, the carriage being returned by the weighted

lever c , as hereinbefore pointed out. At the same time the magazine-wheel is advanced one step.

When the carriage reaches its initial position, the pin g' on the arm G''' of the rock-shaft G is engaged by the cam-shaped flange n of the wheel or disk N and the rock-shaft is rocked forwardly, thus bringing the driving-arm into engagement with the driving-shaft and at the same time bringing the reproducer into engagement with the record-roll. This forward movement of the rock-shaft G brings the arm H under the motor-controlling lever J . The lever J is provided with a downwardly-projecting cam-shaped bend j'' therein, so that as the arm H is carried along under the same the arm is elevated, and this through the connection to the coin-holder d'' ejects the coin therefrom. I desire to state in this connection that the particular object of the cam-shaped flange n of the disk or wheel N is that the reproducer is not brought into engagement with the record-roll until after the vibrations of the machine have ceased, resulting from the adjustment of the magazine-wheel. This reduces the wear and strain upon the reproducer to a minimum.

When the arm G' is thrown upwardly, it engages the pivoted bail I . This bail I is connected by the link I' to the dog b''' . The upward movement of the bail I disengages the dog from the magazine-wheel, allowing the same to be adjusted to bring any record-roll desired into position to be reproduced. A dog b' is oppositely arranged to the dog b''' to prevent the backward revolution of the magazine-wheel. These dogs are supported upon the upper end of the arm b . A spring b'' holds the dog b' downwardly into contact with the periphery of the rim.

The link I' is provided with a lateral projection i , adapted to engage the frame O , by which the friction-wheel R' is carried, so that when the bail is thrown upwardly the friction-wheel is elevated, so that it is not engaged by the wheels C'' of the mandrel-shafts, allowing the same to pass freely under the said wheels. The dog b''' is also held out of engagement, so that the magazine-wheel can be revolved to any position desired by the manipulation of the crank W' . (See Fig. 7.) The shaft W of the crank is supported in a suitable bearing in the door A' of the casing. The inner crank-shaped end w of the shaft W engages the laterally-projecting end t' of the shaft T . This shaft T is supported at its outer end by the standard T' , through which it is arranged, the bearing therefor being sufficiently large to allow the tilting of the shaft therein. On the inner end of the shaft T is a friction-wheel T'' . The inner end of the shaft T is supported by the link U' , one end of which is pivoted on the

pin U on the standard B and the other end is pivoted on the shaft T. The link U' is held against the face of the wheel T'' by a coiled spring *u*. The spring *u* is adjustably retained on the end of the shaft by means of the nut *u'*. The friction of the link U' on the face of the wheel is sufficient so that when the shaft T is revolved the friction-wheel T'' is thrown up into engagement with one of the rims C, thereby driving the magazine-wheel.

A coiled spring *t* is connected to the shaft T to return it when released to its normal position against the post or stop T'''. I thus provide means for adjusting the magazine-wheel independently of the automatic adjusting means, so that the magazine-wheel may be adjusted to bring any desired record into position to be reproduced. This particular means of connecting the crank-shaft W to the shaft T is of special value, as no matter in what position the crank-shaft may be left the door carrying the crank may be closed without any danger of injuring the parts due to their not properly engaging, as might otherwise be the case.

It is sometimes desirable that two records be reproduced upon the introduction of a single coin. To prevent the stopping of the motor at the completion of each reproduction, I provide a catch or stop L for the lever J. This stop consists of a star-wheel having long and short arms, the long arms being of sufficient length to extend under the lever J to prevent its dropping far enough to stop the motor, as I have heretofore described. The arms of this wheel L are adapted to be engaged by the arm H on the forward movement of the carriage, which revolves the stop one step. This brings a long arm into position to support the controlling-lever J of the motor. When the motor-controlling lever J is supported by the stop, the reproducer-carriage is returned to its initial position at once, and as the driving-shaft is in motion the driving-arm of the carriage is thrown into engagement with the driving-shaft. The forward movement of the carriage again acts upon the stop, carrying the long arm out of engaging position, so that at the end of the movement of the carriage the controlling-lever J is allowed to drop to stop the motor.

The stop I have illustrated is adapted to operate so that two records are reproduced upon the introduction of a single coin. It is evident, however, that by the arrangement of the long and short arms more than that number could be reproduced.

I have illustrated and described my improved multiphonograph in detail in what I believe to be its preferred form on account of its structural simplicity and economy and its durability. I am aware, however, that it is capable of very considerable variation in structural details without departing from my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange *n* thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch *m* therein to allow said spring-arm G'' to pass therethrough, and a lug *m'* adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon, adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; connections from said rock-shaft to said adjustable support for said driving-wheel for the said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; means for adjusting said magazine-wheel independently of said pivoted lever; a controlling-lever for the motor; an arm H on said rock-shaft, adapted to engage said controlling-lever when said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting it to drop to stop the motor; a stop L for the said controlling-lever, consisting of a wheel having long and short arms thereon, the long arms of which are adapted to support the lever when released by the said arm H, said arm H being adapted to actuate said wheel for bringing the long arms into and out of position to engage said motor-controlling lever, all coacting for the purpose specified.

2. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported

on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; 5 a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft 10 is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' where- 15 by said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a piv- 20 oted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby 25 said locking-dog is held out of engagement when said rock-shaft is in its rearward position; means for adjusting said magazine-wheel independently of said pivoted lever; a controlling-lever for the motor; an arm H on 30 said rock-shaft, adapted to engage said controlling-lever when said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting it to drop to stop the motor; a stop L for said controlling-lever, 35 consisting of a wheel having long and short arms thereon, the long arms of which are adapted to support the lever when released by the said arm H , said arm H being adapted to actuate said wheel for bringing the long 40 arms into and out of position to engage said motor-controlling lever, all coacting for the purpose specified.

3. In a magazine-phonograph, the combination of a frame; a magazine-wheel; man- 45 drel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with 50 said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on 55 said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having 60 a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to

engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact 70 with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon, adapted to engage said magazine-wheel; connections from said lever to said carriage; connections from said rock-shaft to said adjustable support for said driving- 75 wheel for the said mandrel-shaft wheels, whereby the said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; a controlling-lever for the motor; an arm H on the said rock-shaft, 80 adapted to engage said controlling-lever when said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting it to drop to stop the motor; a stop 85 L for the said controlling-lever, consisting of a wheel having long and short arms thereon, the long arms of which are adapted to support the lever when released by the said arm H , said arm H being adapted to actuate said 90 wheel for bringing the long arms into and out of position to engage said motor-controlling lever, all coacting for the purpose specified.

4. In a magazine-phonograph, the combination of a frame; a magazine-wheel; man- 95 drel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded 100 driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to 105 engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving- 110 shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' where- 115 by said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted 120 lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a controlling-lever for the motor; an arm H on said rock-shaft adapted to engage said controlling-lever when 125 said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting it to drop to stop the motor; a stop L for said controlling-lever, consisting of a wheel having long and short arms thereon, the long arms of which are adapted to sup- 130

port the lever when released by the said arm II, said arm II being adapted to actuate said wheel for bringing the long arms into and out of position to engage said motor-controlling lever, all coacting for the purpose specified.

5 5. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon, adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; connections from said rock-shaft to said adjustable support for said driving-wheel for the said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; means for adjusting said magazine-wheel independent of said pivoted lever; a controlling-lever for said motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

55 6. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon, adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; connections from said rock-shaft to said adjustable support for said driving-wheel for the said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; means for adjusting said magazine-wheel independent of said pivoted lever; a controlling-lever for said motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; means for adjusting said magazine-wheel independent of said pivoted lever; a controlling-lever for the motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

7. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon, adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog, whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; connections from said rock-shaft to said adjustable support for said driving-wheel for the said mandrel-shaft wheels, whereby the said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; means for adjusting said magazine-wheel independent of said pivoted lever; a controlling-lever for said motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

a controlling-lever for the motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into
 5 and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

8. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange n thereon adapted to engage said arm G''' to throw
 20 said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a controlling-lever for the motor; connections from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown
 40 into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

9. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a
 60 lug m' adapted to engage said arm G'' , where-

by said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; connections from said rock-shaft to said adjustable support for said driving-wheel for said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; and means for adjusting said magazine-wheel independent of said pivoted lever, for the purpose specified.

10. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl therein adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; and means for adjusting said magazine-wheel independent of said pivoted lever, for the purpose specified.

11. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-

shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having
 5 a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm
 10 G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-shaft is thrown rear-
 15 wardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon
 20 adapted to engage said magazine-wheel; connections from said lever to said carriage; connections from said rock-shaft to said adjustable support for said driving-wheel for said mandrel-shaft wheels, whereby said driv-
 25 ing-wheel is thrown into and out of position to engage said mandrel-shaft wheels; and means for adjusting said magazine-wheel independent of said pivoted lever, for the purpose specified.

30 12. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a
 35 phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-
 40 shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-
 45 shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' ,
 50 whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-
 55 shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; and means for adjusting said magazine-wheel independent of said pivoted lever, for the pur-
 60 pose specified.

13. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-
 65 shafts; a driving-wheel for said mandrel-

shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage;
 70 a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having a cam-shaped
 75 flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-
 80 shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' , whereby said rock-shaft is thrown rearwardly; connections
 85 from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon adapted to engage
 90 said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said
 95 rock-shaft is in its rearward position; and connections from said rock-shaft to said adjustable support for said driving-wheel for said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to
 100 engage said mandrel-shaft wheels, for the purpose specified.

14. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a
 105 phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-
 110 shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-
 115 shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' whereby said rock-
 120 shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-
 125 shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog for said magazine-wheel; and
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connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position, for the purpose specified.

15. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' , whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; and connections from said rock-shaft to said adjustable support for said driving-wheel for said mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels, for the purpose specified.

16. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft having a cam-shaped flange n thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; a driving-arm G' adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm G'' on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' , whereby said rock-shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said re-

producer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; a pivoted lever having a pawl therein adapted to engage said magazine-wheel; and connections from said lever to said carriage, for the purpose specified.

17. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped flange thereon adapted to engage said arm G''' to throw said rock-shaft forwardly; driving connections for said carriage to said driving-shaft, adapted to be thrown into and out of engaging position by said rock-shaft; a spring-arm on said rock-shaft; a disk M on said driving-shaft, having a notch m therein to allow said spring-arm G'' to pass therethrough, and a lug m' adapted to engage said arm G'' , whereby said rock-shaft is thrown rearwardly; connection from said rock-shaft to said reproducer, whereby said reproducer is thrown into and out of contact with the record-rolls upon the actuation of said rock-shaft; means for advancing said magazine-wheel with a step-by-step movement; connections from said means to said carriage whereby said carriage is returned to its initial position; connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; a controlling-lever for the motor; an arm H on the said rock-shaft, adapted to engage the said controlling-lever when said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting it to drop to stop the motor; a stop for the said controlling-lever consisting of a wheel having long and short arms thereon, the long arms of which are adapted to support the lever when released by the said arm H , said arm H being adapted to actuate said wheel for bringing the long arms into and out of position to engage the said motor-controlling lever, all coacting for the purpose specified.

18. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having suitable driving connections to said motor; a rock-shaft carried by said carriage; an arm G''' on said rock-shaft; a wheel or disk N on said driving-shaft, having a cam-shaped

flange *n* thereon adapted to engage said arm *G'''* to throw said rock-shaft forwardly; driving connections for said carriage to said driving-shaft, adapted to be thrown into and
 5 out of engaging position by said rock-shaft; a spring-arm on said rock-shaft; a disk *M* on said driving-shaft, having a notch *m* therein to allow said spring-arm *G''* to pass there-
 10 through, and a lug *m'* adapted to engage said arm *G''*, whereby said rock-shaft is thrown rearwardly; connections from said rock-shaft to said reproducer, whereby said reproducer is thrown into and out of contact with the
 15 record-rolls upon the actuation of said rock-shaft; means for advancing said magazine-wheel with a step-by-step movement; connections from said means to said carriage whereby said carriage is returned to its initial
 20 position; connections from said rock-shaft to said locking-dog whereby said locking-dog is held out of engagement when said rock-shaft is in its rearward position; a controlling-lever for the motor; connections
 25 from said rock-shaft to said motor-controlling lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, all coacting for the purpose specified.

30 19. In a magazine-phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel with said record-roll; a phonograph-reproducer pivotally supported on said car-
 35 riage; a motor; a screw-threaded driving-shaft having a suitable driving connection to said motor; a rock-shaft carried by said carriage; an arm *G'''* on said rock-shaft; a wheel or disk *N* on said driving-shaft having a cam-
 40 shaped flange *n* thereon adapted to engage said arm *G'''* to throw said rock-shaft forwardly; a driving-arm *G'* adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm *G''* on said
 45 rock-shaft; a disk *M* on said driving-shaft, having a notch *m* therein to allow said spring-arm *G''* to pass therethrough, and a lug *m'* adapted to engage said arm *G''*, whereby said rock-shaft is thrown rearwardly; connections
 50 from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-roll upon the actuation of said rock-shaft; and connections from said rock-shaft to said motor, for the
 55 purpose specified.

20. In a magazine-phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel with said record-roll; a phonograph-reproducer pivotally supported on said car-
 60 riage; a motor; a screw-threaded driving-shaft having a suitable driving connection to said motor; a rock-shaft carried by said carriage; an arm *G'''* on said rock-shaft; a wheel
 65 or disk *N* on said driving-shaft having a cam-

shaped flange *n* thereon adapted to engage said arm *G'''* to throw said rock-shaft forwardly; driving connections for said carriage to said driving-shaft adapted to be thrown
 70 into and out of engaging position by said rock-shaft; a spring-arm *G''* on said rock-shaft; a disk *M* on said driving-shaft, having a notch *m* therein to allow said spring-arm *G''* to pass therethrough, and a lug *m'* adapted to engage said arm *G''*, whereby said rock-
 75 shaft is thrown rearwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-roll upon the actuation of said rock-shaft; and connections from said
 80 rock-shaft to said motor, for the purpose specified.

21. In a magazine-phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate
 85 parallel with said record-roll; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having a suitable driving connection to said motor; a rock-shaft carried by said car-
 90 riage; an arm *G'''* on said rock-shaft; a wheel or disk *N* on said driving-shaft having a cam-shaped flange *n* thereon adapted to engage said arm *G'''* to throw said rock-shaft forwardly; a driving-arm *G'* adapted to engage
 95 said driving-shaft when said rock-shaft is in its forward position; a spring-arm *G''* on said rock-shaft; a disk *M* on said driving-shaft, having a notch *m* therein to allow said spring-arm *G''* to pass therethrough, and a
 100 lug *m'* adapted to engage said arm *G''*, whereby said rock-shaft is thrown rearwardly; and connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-roll
 105 upon the actuation of said rock-shaft, for the purpose specified.

22. In a magazine-phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate
 110 parallel with said record-roll; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-threaded driving-shaft having a suitable driving connection to said motor; a rock-shaft carried by said car-
 115 riage; an arm *G'''* on said rock-shaft; a wheel or disk *N* on said driving-shaft having a cam-shaped flange *n* thereon adapted to engage said arm *G'''* to throw said rock-shaft forwardly; driving connections for said carriage
 120 to said driving-shaft adapted to be thrown into and out of engaging position by said rock-shaft; a spring-arm *G''* on said rock-shaft; a disk *M* on said driving-shaft, having a notch *m* therein to allow said spring-arm
 125 *G''* to pass therethrough, and a lug *m'* adapted to engage said arm *G''*, whereby said rock-shaft is thrown rearwardly; and connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and
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out of contact with the record-roll upon the actuation of said rock-shaft, for the purpose specified.

23. In a phonograph, the combination of a
5 record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the
10 same into and out of engagement with said record-roll; a screw-threaded driving-shaft; a driving-arm on said rock-shaft adapted to engage said driving-shaft when said rock-shaft is in its forward position; a spring-arm on said
15 rock-shaft; and a disk on said driving-shaft having a notch therein and having a laterally-projecting lug on its outer face adapted to engage said spring-arm to actuate said rock-shaft, for the purpose specified.

24. In a phonograph, the combination of a
20 record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; driving connections for said carriage to said driving-shaft; a spring-arm on
25 said rock-shaft; and a disk on said driving-shaft having a notch therein and having a laterally-projecting lug on its outer face adapted to engage said spring-arm to actuate said rock-shaft, for the purpose specified.

25. In a phonograph, the combination of a
30 record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; a driving-arm on said rock-shaft adapted to engage said driving-shaft when
35 said rock-shaft is in its forward position; an arm on said rock-shaft; and a disk on said driving-shaft having a notch therein and having a laterally-projecting lug on its outer face adapted to engage said arm to actuate
40 said rock-shaft, for the purpose specified.

26. In a phonograph, the combination of a
45 record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; driving connections for said
50 carriage to said driving-shaft; an arm on said rock-shaft; and a disk on said driving-shaft having a notch therein and having a laterally-projecting lug on its outer face adapted to engage said arm to actuate said
55 rock-shaft, for the purpose specified.

27. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft
60 adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; a driving-arm on said rock-shaft adapted to engage said driving-shaft
65 when said rock-shaft is in its forward position; a spring-arm on said rock-shaft; and a disk on said driving-shaft having a notch therein adapted to engage said spring-arm to actuate said rock-shaft, for the purpose specified.

28. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally
70 supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; driving connections for said
75 carriage to said driving-shaft; a spring-arm on said rock-shaft; and a disk on said driving-shaft having a notch therein adapted to engage said spring-arm to actuate said rock-shaft, for the purpose specified.

29. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft
80 adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a spring-arm on said rock-shaft; a disk having a notch therein and having a laterally-projecting lug on its
85 outer face adapted to engage said spring-arm to actuate said rock-shaft; and driving connections for said disk or wheel, for the purpose specified.

30. In a phonograph, the combination of a
90 record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a spring-arm on said
95 rock-shaft; a disk having a notch therein adapted to engage said spring-arm to actuate said rock-shaft; and driving connections for said disk or wheel, for the purpose specified.

31. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; a screw-threaded driving-shaft; a driving-arm on said rock-shaft adapt-
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ed to engage said screw-threaded driving-shaft when the rock-shaft is in its forward position; an arm on said rock-shaft having a laterally-projecting yielding pin thereon; and
 5 a disk or wheel on said driving-shaft having a flange with an inwardly-deflected end thereon adapted to engage said pin on said arm to throw the same downwardly to bring the reproducer into contact with the record-roll,
 10 and the driving-arm into engagement with the driving-shaft, for the purpose specified.

32. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel there-
 15 with; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; a screw-threaded driving-shaft; a
 20 driving-arm on said rock-shaft adapted to engage said screw-threaded driving-shaft when the rock-shaft is in its forward position; an arm on said rock-shaft; and a disk or wheel on said driving-shaft having a flange with an
 25 inwardly-deflected end thereon adapted to engage said arm to throw the same downwardly to bring the reproducer into contact with the record-roll, and the driving-arm into engagement with the driving-shaft, for the purpose
 30 specified.

33. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel there-
 35 with; a phonograph-reproducer carried by said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; an arm on said rock-shaft having a laterally-projecting yielding pin thereon; a disk
 40 or wheel having a flange with an inwardly-deflected end thereon adapted to engage said pin on said arm to throw the same downwardly to bring the reproducer into contact with the record-roll; and driving connections for said disk or wheel, for the purpose speci-
 45 fied.

34. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel there-
 50 with; a phonograph-reproducer carried by said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; an arm on said rock-shaft; a disk or wheel
 55 having a flange with an inwardly-deflected end thereon adapted to engage said arm to throw the same downwardly to bring the reproducer into contact with the record-roll; and driving connections for said disk or wheel,
 60 for the purpose specified.

35. In a magazine-phonograph, the combination of a suitable frame; a motor; a magazine-wheel carrying mandrels; record-rolls on
 65 said mandrels; driving connections for said

parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer
 70 to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said
 75 magazine-wheel; connections for said locking-dog to said rock-shaft; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; a controlling-lever for said
 80 motor; an arm on said rock-shaft adapted to engage said controlling-lever when said rock-shaft is in its forward position, and to release the same when said rock-shaft is in its rearward position, thereby permitting the said
 85 lever to drop and stop the motor; a stop for said controlling-lever consisting of a wheel having long and short arms thereon, the long arms of which are adapted to support the controlling-lever when released by said rock-shaft arm, said rock-shaft arm being adapted
 90 to actuate said wheel for bringing the long arms into and out of position to engage said motor-controlling lever, for the purpose specified.

36. In a magazine-phonograph, the combination of a suitable frame; a motor; a magazine-wheel carrying mandrels; record-rolls
 95 on said mandrels; driving connections for said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower
 100 said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; means for returning said carriage to its initial position, adapted to actuate said magazine-
 105 wheel with a step-by-step movement; a controlling-lever for said motor; an arm on said rock-shaft adapted to engage said controlling-lever when said rock-shaft is in its forward position, and to release the same when
 110 said rock-shaft is in its rearward position, thereby permitting the said lever to drop and stop the motor; a stop for said controlling-lever consisting of a wheel having long and short arms thereon, the long arms of which
 115 are adapted to support the controlling-lever when released by said rock-shaft arm, said rock-shaft arm being adapted to actuate said wheel for bringing the long arms into and out of position to engage said motor-controlling
 120 lever, for the purpose specified.

37. In a magazine-phonograph, the combination of a suitable frame; a motor; a magazine-wheel carrying mandrels; record-rolls
 130 on said mandrels; driving connections for

said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; a controlling-lever for said motor; connections from said rock-shaft to said controlling-lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, for the purpose specified.

38. In a magazine-phonograph, the combination of a suitable frame; a motor; a magazine-wheel carrying mandrels; record-rolls on said mandrels; driving connections for said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; a controlling-lever for said motor; connections from said rock-shaft to said controlling-lever; and a stop for said motor-controlling lever adapted to be thrown into and out of engaging position by the reciprocation of said carriage, for the purpose specified.

39. In a magazine-phonograph, the combination of a suitable frame; a motor; a record-roll magazine; record-rolls carried thereby; a carriage adapted to reciprocate parallel with said record-rolls; means for actuating said carriage; a controlling-lever for said motor; connections from said carriage to said lever, adapted to be released at the end of the movement of said carriage to stop the motor; and a stop for said controlling-lever, adapted to be thrown into and out of engaging position by the reciprocation of said carriage, for the purpose specified.

40. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage,

adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all co-acting for the purpose specified.

41. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheels; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all co-acting for the purpose specified.

42. In a magazine-phonograph, the combi-

nation of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

43. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally

out of engagement with said magazine-wheel, all coacting for the purpose specified.

44. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheels; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

45. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; means for returning said carriage to its initial position, adapted to actuate said magazine-wheel with a step-by-step movement; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' nor-

mally out of engagement with said magazine-wheel, all coacting for the purpose specified.

46. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported in said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; connections from said rock-shaft to said adjustable support for the driving-wheel of the mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

47. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shaft; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to en-

gage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

48. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; connections from said rock-shaft to the motor; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

49. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; connections from said rock-shaft to said adjustable support for the driving-wheel for the mandrel-shaft wheels, whereby said driving-wheel is thrown into and out of position to engage said mandrel-shaft wheels; a pivotally-supported shaft T having a friction-wheel T' and a laterally-projecting arm t' thereon; a pivotally-supported link on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T'; a crank-shaft W adapted to engage said arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T' normally out of engagement with

said magazine-wheel, all coacting for the purpose specified.

50. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; wheels on said mandrel-shafts; a driving-wheel for said mandrel-shaft wheels; an adjustable support therefor; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; connections from said rock-shaft to said adjustable support for the driving-wheel for the said mandrel-shaft wheels, whereby said driving-shaft is thrown into and out of position to engage said mandrel-shaft wheels; a pivotally-supported shaft T having a friction-wheel T'' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T''; a crank-shaft W adapted to engage the arm t' of said shaft T, carried by the door of said casing; and a spring for holding said friction-wheel T'' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

51. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; mandrel-shafts having record-rolls thereon carried by said wheel; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage, adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the end of the movement of said carriage; a locking-dog for said magazine-wheel; connections for said locking-dog to said rock-shaft; a pivotally-supported shaft T having a friction-wheel T'' and a laterally-projecting arm t' thereon; a pivotally-supported link U' on the inner end of said shaft T; a spring adapted to hold said link in frictional contact with the face of said wheel T''; a crank-shaft W adapted to engage the arm t' of said shaft T carried by the door of said casing; and a spring for holding said friction-wheel

T'' normally out of engagement with said magazine-wheel, all coacting for the purpose specified.

52. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; a pivotally-supported shaft having a friction-wheel and a laterally-projecting arm thereon; a pivotally-supported link on said shaft; a spring adapted to hold said link in frictional contact with the face of said wheel; and a crank adapted to engage the arm on said shaft carried by the door of said casing, for the purpose specified.

53. In a magazine-phonograph, the combination of a casing; a door therefor; a magazine-wheel; a pivotally-supported shaft having a friction-wheel and a laterally-projecting arm thereon; a pivotally-supported link on said shaft; and a crank adapted to engage the arm on said shaft carried by the door of said casing, for the purpose specified.

54. In a magazine-phonograph, the combination of a casing; a magazine-wheel; a pivotally-supported shaft having a friction-wheel thereon and a laterally-projecting arm thereon; a pivotally-supported link on said shaft; a spring adapted to hold said link in frictional contact with the face of said wheel; and a crank adapted to engage the arm on said shaft, for the purpose specified.

55. In a magazine-phonograph, the combination of a casing; a magazine-wheel; a pivotally-supported shaft having a friction-wheel and a laterally-projecting arm thereon; a pivotally-supported link on said shaft; and a crank adapted to engage the arm on said shaft, for the purpose specified.

56. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft having a friction-wheel and a laterally-projecting arm thereon; a pivotally-supported link on said shaft; and a spring adapted to hold said link in frictional contact with said wheel; for the purpose specified.

57. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft having a friction-wheel thereon and a laterally-projecting arm thereon; and a pivotally-supported link on said shaft, for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

CYRUS C. SHIGLEY. [L. s.]

Witnesses:

ALEXANDER S. PALMER,
T. H. PAXTON.

H. P. ROBERTS.
SOUND RECORDING DEVICE.
APPLICATION FILED NOV. 29, 1904.

Fig. 1

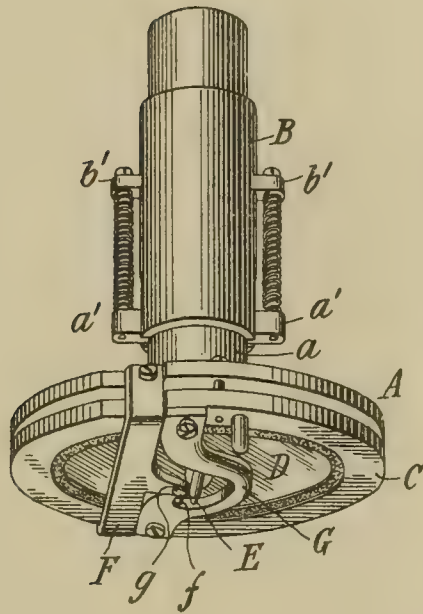


Fig. 2

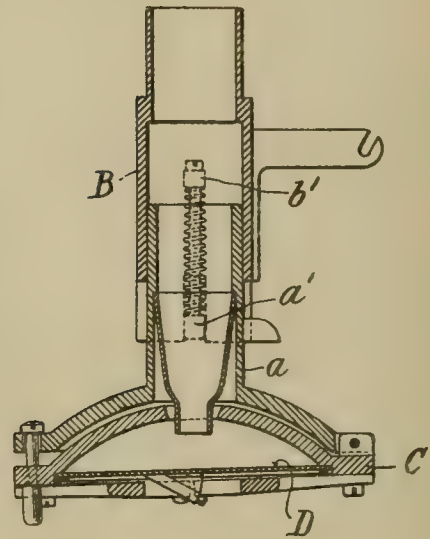
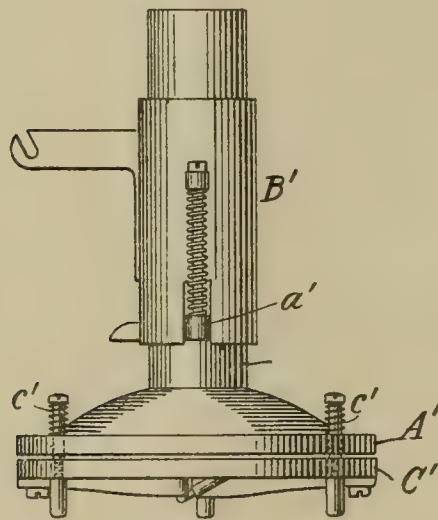


Fig. 3



Witnesses
W. B. Kram
Master R. Thompson.

Inventor
Harry P. Roberts,
Mauro, Cameron, Lewis & Missie, attys.

UNITED STATES PATENT OFFICE.

HENRY P. ROBERTS, OF NEW YORK, N. Y.

SOUND-RECORDING DEVICE.

No. 816,742.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed November 29, 1904. Serial No. 234,762.

To all whom it may concern:

Be it known that I, HENRY P. ROBERTS, a citizen of the United States, and a resident of the borough of Brooklyn, New York city, New York, (whose post-office address is No. 163 Midwood street, Brooklyn, New York,) have invented a new and useful Improvement in Sound-Recording Devices, which improvement is fully set forth in the following specification.

My invention consists of a sound-recording device; and its principal object is to provide such device or "speaker," as it is commonly called, as will be automatically adjustable for recording upon blank cylinders of different thicknesses.

My invention consists in arranging the parts so that the diaphragm, with its recording-stylus, will be moved toward and from the blank cylinder in a position always parallel with itself (so that the stylus will always be presented at the same angle) and in certain other details of construction and arrangement that will be pointed out later.

The invention will best be understood by reference to the accompanying drawings, which illustrate the preferred embodiment and certain modifications.

Figure 1 is a perspective of one form of my invention. Fig. 2 is a vertical section thereof, and Fig. 3 shows a modification.

Referring to Figs. 1 and 2, A is the main portion or head, an inverted saucer in shape, having a tubular stem *a*, that telescopes in a tube B, which latter is attached in any convenient manner to the longitudinally-moving carriage on the talking-machine. The upper end of this tube B is adapted to carry the speaking-tube for dictating (or otherwise making) the record. Upon the tube *a* are two lugs *a'*, which pass through longitudinal slots in the side of the tube B, and upon the tube B are corresponding lugs *b'*, between which and lugs *a'* are coiled springs inclosing small guide-rods fast on one set of lugs and sliding through the other. By this arrangement the action of the springs tends to force the main portion A downward against the blank cylinder. Hinged to one side of the portion A is another plate C, which carries the diaphragm D, upon which latter is the recording-stylus E. The plate C has a small central orifice communicating with the tube *a*

by means of the usual "thimble" for insuring a practically air-tight passage-way from the space behind the diaphragm. The construction and arrangement of this thimble and its adjacent parts form no part of my invention, the same being well known.

F is a bridge secured to the portion A and straddling the hinged portion C. This bridge serves as a stop to limit the play of the diaphragm-plate C. It also serves to limit the extent to which the coil-springs depress the main portion by means of a tracking device or determining device carried, as at *f*, in juxtaposition to the recording-stylus E. This device *f* is preferably a small sapphire ball, like the well-known reproducer.

G is another bridge carried by the hinged plate C and itself carrying (adjacent the stylus E) a tracking device *g*, similar to the device *f*. This bridge G is shown as bent or curved in order to leave a clear space for the recording-stylus E.

The function of each of the parts and the operation of my device as a whole will now be understood. When inserted in place upon a talking-machine in connection with a blank cylinder, the coil-springs will force the main portion and the recording part down upon the cylinder until the determining device *f* rests upon the surface of the blank cylinder, the parts being so adjusted that the recording-stylus E will then be embedded the proper distance into the material of the blank cylinder. The tracking device *f* thus serves as a stop for and bears the weight and stress of the main portion and the coil-springs. In like manner the tracking device *g* serves as a stop for and bears the weight of the hinged portion C, being so adjusted that it permits the recording-stylus E to be embedded the proper distance. There are three sets of movements thus taken into consideration in my device: First, the appreciable adjustment of the device to enable it to be used with a thick blank cylinder and again with a thin blank cylinder, the difference in thickness being sometimes quite great. This adjustment is accomplished by the action of the coil-springs, which telescope the portion A, and in general takes place only once with each cylinder. Second, compensation for the accidental or undesirable eccentricities of the blank cylinder itself, which in most instances

cannot be observed by the eye, but which (if not otherwise compensated for) would interfere with the proper recording and the subsequent reproduction of sounds. These eccentricities are compensated for by the swing of the plate C upon its hinge. The third set of movements is that due to the normal action of the sound-waves, which takes place through the elasticity of the diaphragm.

I have found by actual tests that not only is the principal feature of my invention—namely, the automatic adjustment for cylinders of different thicknesses—of great advantage, but owing to the sensitiveness and delicacy of my device the records made by it are actually louder and clearer than those made by other devices.

The coiled springs (shown in Figs. 1 and 2) may be dispensed with and gravity relied on to take their place, or some other form and arrangement of springs (or their equivalent) may be employed. Furthermore, the bridge G and its tracking device *g* may be dispensed with; but in such case the diaphragm-plate C and its parts will be made rather lighter than before.

In the modification shown in Fig. 3 the diaphragm-plate C' is not hinged to the telescoping portion A', but is free to move bodily to and from the latter parallel with itself, being guided by three or more guide-rods *c'*, fast on plate C' and passing through portion A'. Delicate springs may be interposed between the portion A' and the hands of the rods *c'*; but preferably such springs will be dispensed with. In this modification also the bridge G may be dispensed with. Again, in the construction set forth by Fig. 3 the two telescoping portions A' and B' may be made in one, and the bodily movement of the diaphragm-plate C' is relied on for both the coarser adjustment for different cylinders and the more delicate continuous adjustment for the eccentricities of each cylinder.

I have described my invention with some particularity of detail, but merely for the sake of clearness, since I do not limit myself to the precise constructions and arrangements herein set forth. Modifications may be made therein and parts of my invention used to the exclusion of other parts without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In a sound-recording device, the combination of a fixed portion, a portion telescoping therein, a diaphragm pivoted to said telescoping portion and carrying a stylus, a tracking device carried by said telescoping portion, a second tracking device carried by said diaphragm, and automatic means for forcing said telescoping portion downward.

2. In a sound-recording device, the combination with a bridge to carry the thrust of the recorder, of a diaphragm having bodily movement independent of said bridge.

3. In a sound-recording device, the combination of a plate, a diaphragm carrying a stylus and held by said plate, two vertically-telescoping members constituting a vertical sound-conveying passage, said plate being pivoted upon the relatively movable member aforesaid.

4. In a sound-recording device, the combination of a plate, a diaphragm carrying a stylus and held by said plate, two vertically-telescoping members constituting a vertical sound-conveying passage, said plate being pivoted upon the relatively movable member aforesaid, and automatically-operating mechanism for forcing said movable member downward.

5. In a sound-recording device, the combination of a plate, a diaphragm carrying a stylus and held by said plate, two vertically-telescoping members constituting a vertical sound-conveying passage, said plate being pivoted upon the relatively movable member aforesaid, and a tracking device also carried by said movable member.

6. In a sound-recording device, the combination of a plate, a diaphragm carrying a stylus and held by said plate, two vertically-telescoping members constituting a vertical sound-conveying passage, said plate being pivoted upon the relatively movable member aforesaid, a tracking device also carried by said movable member, and automatically-operating means for forcing said movable member downward.

7. In a sound-recording device, the combination of a vertically-movable diaphragm-support, a plate hinged to said support and carrying a diaphragm with its stylus, and automatically-operating means for moving said support and diaphragm downward for engagement with blank cylinders of different thicknesses.

8. In a sound-recording device, the combination of a vertically-movable plate-support, a diaphragm hinged to said support and carrying a diaphragm with its stylus, and automatically-operating means for moving said support and diaphragm downward for engagement with blank cylinders of different thicknesses.

9. In a sound-recording device, the combination of a relatively stationary vertical tube adapted for engagement upon a movable carriage of a talking-machine, a second tube telescoping therein and terminating at its lower end in a flaring portion, a similarly-shaped plate having a central opening hinged thereto and nesting within said flare, a dia-

phragm with its stylus carried by said hinged plate, and automatically-operating means for forcing said diaphragm downward.

5 10. In a sound-recording device, the combination of a relatively stationary vertical tube and a tube telescoping vertically therein to form a continuous sound-conveying passage, a plate carrying a diaphragm and stylus and hinged to said movable tube, and spring-ac-

tuated means for automatically forcing said plate and diaphragm downward.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRY P. ROBERTS.

Witnesses:

C. A. L. MASSIE,

R. L. SCOTT.



J. GAYNOR.
SOUND BOX.

APPLICATION FILED OCT. 27, 1905.

Fig. 1.

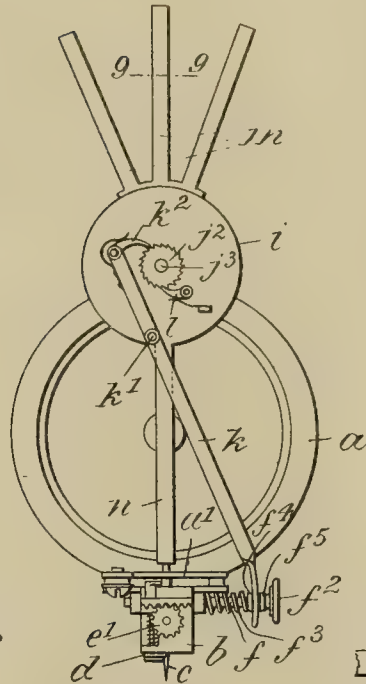


Fig. 2.

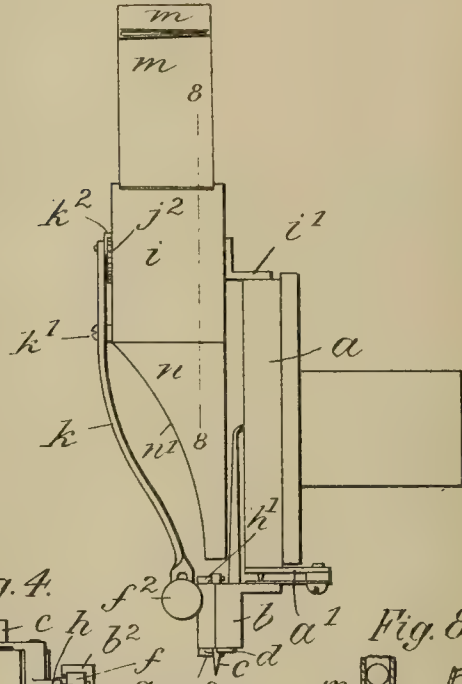


Fig. 9.

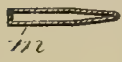


Fig. 3.

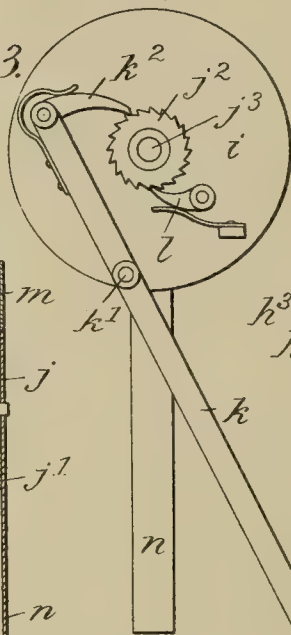


Fig. 7.

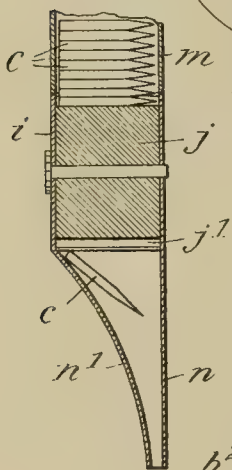


Fig. 4.

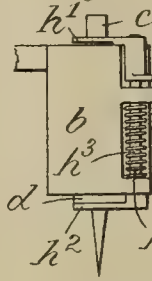


Fig. 8.

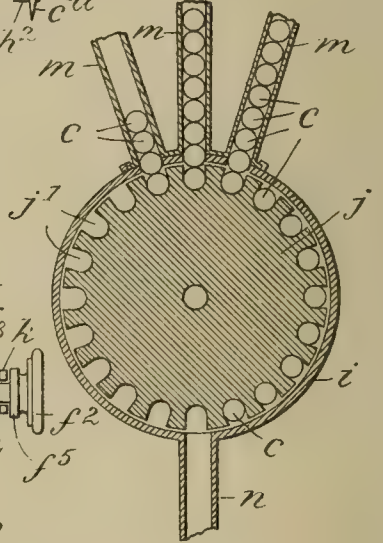


Fig. 5.

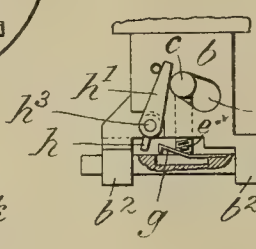
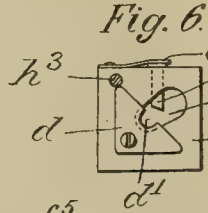


Fig. 6.



Witnesses:
Arthur Zumpfe.
William Schulz.

Inventor:

Joseph Gaynor
by Frank Biesen Att'y.

UNITED STATES PATENT OFFICE.

JOSEPH GAYNOR, OF NEW YORK, N. Y.

SOUND-BOX.

No. 816,908.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed October 27, 1905. Serial No. 284,616.

To all whom it may concern:

Be it known that I, JOSEPH GAYNOR, a citizen of the United States, residing at New York city, Manhattan, county and State of New York, have invented new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

This invention relates to an improved sound-box for talking-machines of the class having disk-shaped records. With these machines it is necessary to frequently replace the needle engaging the record.

The object of the invention is to provide means whereby the exchange of a new needle for the worn needle may be quickly effected in a simple manner and by a single manipulation.

In the accompanying drawings, Figure 1 is a front elevation of my improved sound-box; Fig. 2, a side view thereof; Fig. 3, an enlarged front view of the needle-operating mechanism; Fig. 4, a side view of the needle-holder; Fig. 5, a plan, partly in section, thereof; Fig. 6, a bottom view thereof with some of the parts omitted; Fig. 7, a detail of the needle-feeder; Fig. 8, an enlarged section thereof on line 8 8, Fig. 2; Fig. 9, a cross-section through the magazine on line 9 9, Fig. 1.

The letter *a* indicates the sound-box of a talking-machine, to which is secured by a plate *a'* the needle-holder *b*. The latter consists of a block having a perforation *b'*, which extends from top to bottom and is adapted for the reception of a needle *c*. The perforation *b'* is of elongated or oval form, as shown in Fig. 2. The needle *c* is normally contained within the inner portion of perforation *b'* and is supported upon a base-plate *d*, having a notch *d'* of less diameter than the maximum diameter of the needle. The plate *d* extends below the inner portion of perforation *b'*, but not below the outer portion thereof. By means of plate *d* the needle is normally suspended from the holder in such a manner that its point projects below the same to engage the record. The needle is secured in position by a clamp-screw *e*, tapped into the holder and bearing with its end against the body of the needle. Screw *e* has a toothed head or pinion *e'*, engaged by a rack *f'*, integral with a plunger *f*, carrying a push-button *f²* and retracted by a spring *f³*. The plunger slides in guides *b²* of holder *b*, and by advancing the plunger screw *e* will be

slackened to release old needle *c*, while when the plunger is retracted the screw will be tightened against a new needle.

To plunger *f* is secured a laterally-extending resilient finger *g*, arranged in the path of the tail *h* of an ejector adapted to throw the needle *c* laterally out of inner part of opening *b'* and into the outer part thereof as soon as the needle is released. The ejector is composed of an upper arm *h'* and a lower arm *h²* integral with an upright connecting-spindle *h³*, turning in holder *b* and influenced by a coiled spring *h⁴*. The arms *h'* *h²* are arranged, respectively, opposite the upper and lower ends of needle *c*, so that when turned they will throw the needle off support *d* and out of inner part of opening *b'*. The movement of the ejector is effected by the advance of plunger *f*, which after slacking screw *e* will by finger *g* push against tail *h*, so that the arms *h'* *h²* are swung against needle *c*. As soon as the finger *g* has cleared tail *h* the ejector is returned to its normal position by spring *h⁴*.

The plunger *f*, besides expelling the worn needle in the manner described, also actuates the means for feeding a new needle and clamping the same to the holder. These means consist of a tubular casing *i*, secured to sound-box *a* by bracket *i'*. Within casing *i* turns a cylindrical plug or needle-feeder *j*, having a series of parallel and equally-spaced grooves *j'*, each adapted for the reception of one of the needles *c*. The plug *j* receives intermittent rotatory movement from plunger *f* by two-arm lever *k*, fulcrumed to casing *i* at *k'*. The forked lower arm of lever *k* grasps plunger *f* between a pair of collars *f⁴* *f⁵*. To the upper arm of lever *k* is pivoted a spring-pawl *k²*, engaging a ratchet-wheel *j²*, fast on shaft *j³* of plug *j*. The ratchet-wheel *j²* is further engaged by a detent *l*, that holds plug *j* against backward rotation.

The plug *j* is charged, preferably, from a number of magazines *m*, Fig. 8, opening through casing *i*, to which they are detachably secured. These magazines are arranged side by side and will be successively emptied by the intermittent rotation of plug *j*. In cross-section each magazine *m* tapers to conform to the shape of the needle, Fig. 9. At its bottom casing *i* communicates with a chute *n*, having a curved or tapering side *n'* and arranged vertically above the inner contracted portion of opening *b'*. The tapering

side n' of chute n serves to right the needles c after the latter leave plug j , as indicated in Fig. 7.

A beveled spring-pawl o' , extending across opening b' , serves to prevent the needle from falling out of the inner part of the opening before it becomes engaged by screw e .

The operation of the device will be readily understood. A pressure on button f^2 will cause plunger f to advance and to perform during such advance three successive operations. First, it will, by rack f' and pinion e' , turn screw e to release the worn needle c , which will then remain suspended on support d . Second, it will, by finger g and tail h , turn the ejector to throw the released needle laterally out of inner part of opening b' and off support d . When this second operation has been performed, the ejector will be returned to its normal position by spring h^4 . Third, the plunger f will tilt lever k , and thereby turn plug j , so that the lowermost charged groove j' becomes alined with chute n to discharge its needle c through the latter into opening b' . The needle will thus fall through the holder until it becomes seated on support d . Upon the release of the plunger the latter is retracted by spring f^3 . During its return movement the plunger will by rack f' tighten screw e against the newly-introduced needle, so that the latter is clamped to the holder ready for use.

What I claim is—

1. A sound-box for talking-machines provided with a needle-holder, means for clamping the needle to the holder, and means for displacing the needle laterally from within the holder, substantially as specified.

2. A sound-box for talking-machines provided with a needle-holder having an elongated opening, means for clamping the needle to the holder, and means for displacing

the needle laterally from within the opening, substantially as specified.

3. A sound-box for talking-machines provided with a needle-holder having an elongated opening, a screw for clamping the needle to the holder, a spring-pawl adapted to extend across the opening, and means for displacing the needle laterally from within the opening, substantially as specified.

4. A sound-box for talking-machines provided with a needle-holder, a plunger, and separate means operatively connected to the plunger for clamping the needle to the holder and for displacing the needle laterally from within the holder, substantially as specified.

5. A sound-box for talking-machines provided with a needle-holder, a plunger, a pivoted ejector having laterally-extending arms adapted to engage the needle, and means for operatively connecting the plunger to said ejector, substantially as specified.

6. A sound-box for talking-machines provided with a needle-holder, a plunger, a clamp-screw, a pivoted ejector having laterally-extending arms, and means for operatively connecting the plunger to the clamp-screw and to the ejector, substantially as specified.

7. A sound-box for talking-machines provided with a tubular casing, an inclosed grooved plug, a plurality of magazines communicating with the casing, a needle-holder, and a chute intermediate the casing and said holder, substantially as specified.

Signed by me at New York city, (Manhattan,) New York, this 25th day of October, 1905.

JOSEPH GAYNOR.

Witnesses:

FRANK V. BRIESEN,
WILLIAM SCHULZ.

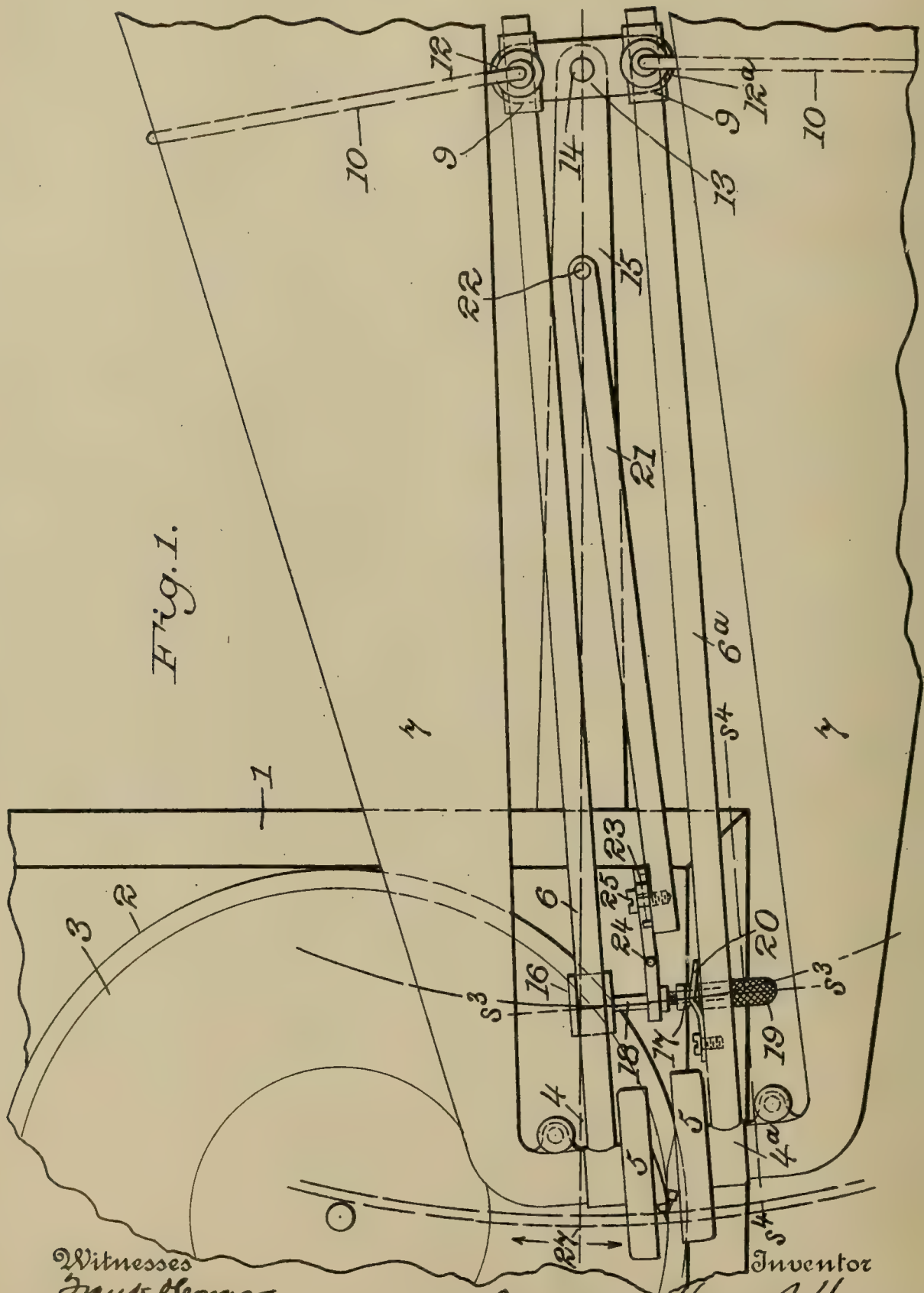
No. 816,978.

PATENTED APR. 3, 1906.

H. J. HAGEN.
TALKING MACHINE.

APPLICATION FILED MAR. 28, 1905.

3 SHEETS—SHEET 1.



Witnesses
Frank Hanna
M. G. Crawford

Inventor
Henry J. Hagen
By his Attorney
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No. 816,978.

PATENTED APR. 3, 1906.

H. J. HAGEN.
TALKING MACHINE.

APPLICATION FILED MAR. 28, 1906.

3 SHEETS—SHEET 2.

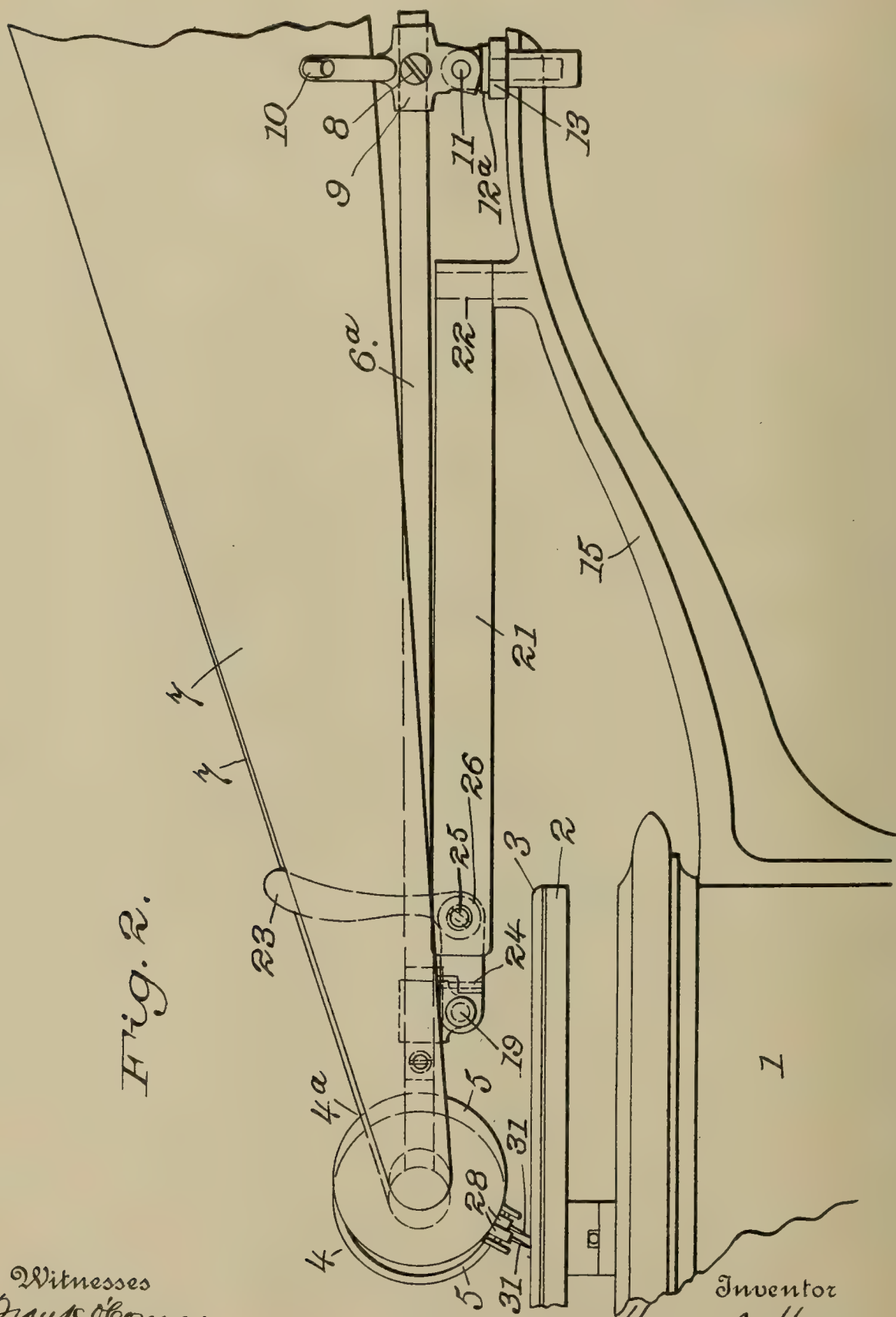


Fig. 2.

Witnesses
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No. 816,978.

PATENTED APR. 3, 1906.

H. J. HAGEN.

TALKING MACHINE.

APPLICATION FILED MAR. 28, 1905.

3 SHEETS—SHEET 3.

Fig. 3.

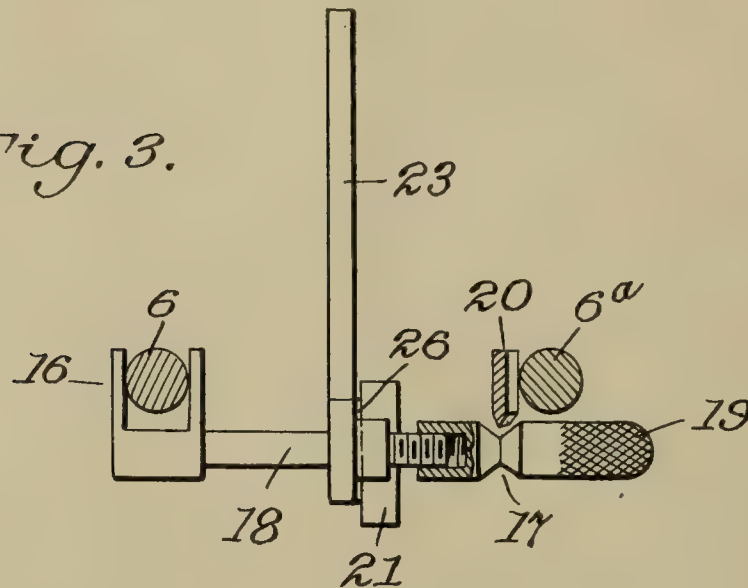
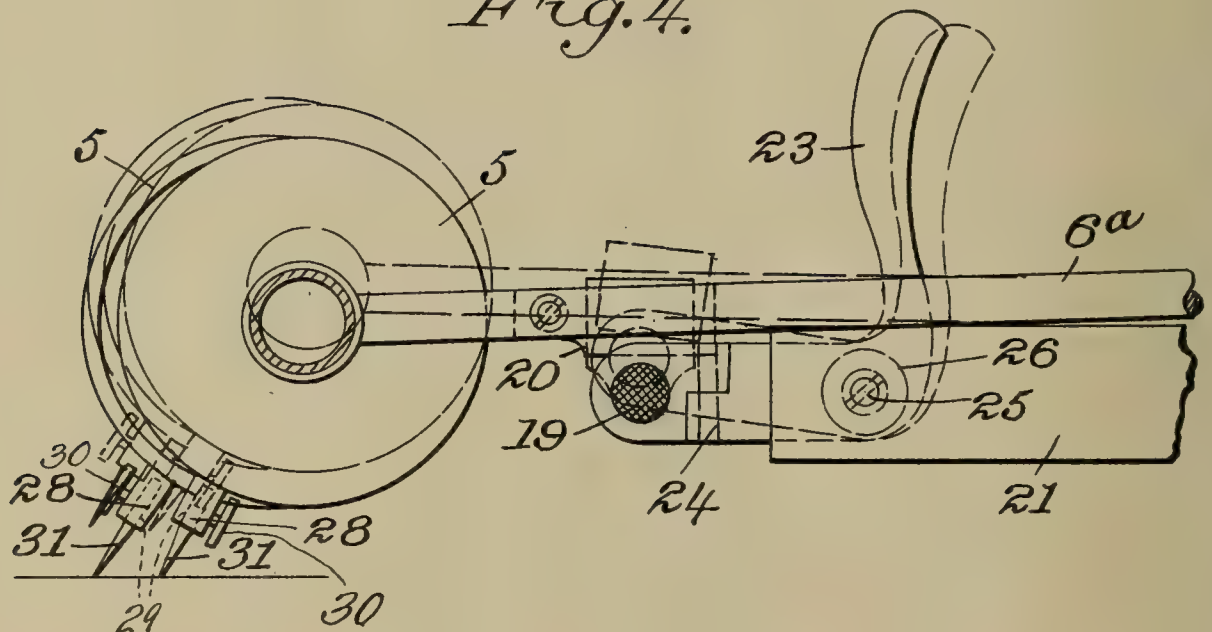


Fig. 4.



Witnesses
Frank O'Connor
M. G. Crawford

Inventor
Henry J. Hagen,
By his Attorney
W. H. Humphrey.

UNITED STATES PATENT OFFICE.

HENRY J. HAGEN, OF ORANGE, NEW JERSEY, ASSIGNOR TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

TALKING-MACHINE.

No. 816,978.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed March 28, 1905. Serial No. 252,542.

To all whom it may concern:

Be it known that I, HENRY J. HAGEN, a citizen of the United States of America, residing at Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to talking-machines or sound-reproducing apparatus in general, and as herein embodied is designed to produce a polyphone or multiple reproducer-machine employing, preferably, the disk type of record. Such machines are ordinarily used in concert-halls or for exhibition or like purposes where the volume of sound must be greatly increased in order to be distinctly heard in all parts of an auditorium.

The present invention relates particularly to the mounting and arrangement of the several reproducers relatively to the record, the object being to obtain exact alinement and freedom of movement thereof in order to insure, first, proper engagement of the reproducers with the groove in the record, and, second, the requisite yielding action of the reproducers in following the undulations of the groove.

The accompanying drawings will serve to illustrate mechanism suitable for carrying my invention into effect.

In the drawings, Figure 1 is a view in plan, illustrating the application of my invention to a well-known form of disk machine. Fig. 2 is a view in elevation thereof. Fig. 3 is a cross-sectional view taken on the line $s^3 s^3$ of Fig. 1; and Fig. 4 is a detail sectional view taken on the line $s^4 s^4$ of Fig. 1, showing in dotted lines the guides adjusted and the reproducers elevated thereby above and clear of the record.

Referring now to the drawings, 1 represents the casing of the machine, and 2 the rotating table thereof, upon which the disk record 3 is supported in the usual manner. Mounted to coöperate with the record I have shown two reproducers 4 4^a; but this number may be increased, if desired, or I may employ other forms of such devices. As shown, each reproducer consists of a sound-box 5, carried by a rod or other support, such as 6 or 6^a, and having a horn 7 connected therewith in the usual manner. Secured upon each of the rods 6 6^a by a set-screw 8 there is

a sleeve 9, from which a bent wire 10 projects as a support for the horn. The sleeves are pivoted at 11 to posts 12 12^a to permit limited vertical movement of the reproducers, as in machines of this class now in general use. The horizontal movement of the reproducers is provided for by mounting the posts 12 12^a upon an arm 13, which is pivoted at 14 to a bracket 15, projecting from the casing of the machine. The post 12 is secured fast upon the arm 13, and the reproducer 4, connected therewith through the rod 6, is movable about the pivot 14 as a center. The post 12^a is rotatably mounted upon the opposite end of the arm and serves as the pivotal center about which the reproducer 4^a swings. As the arcs described by the reproducers in their movement across the record are substantially parallel, the rods 6 6^a may, if desired, be mounted to turn about the same vertical axis, this dispensing with the arm 13. Being free to swing vertically and horizontally, the reproducers when properly adjusted, as shown, for example, in Fig. 1, will follow the undulating groove in the record as the latter is rotated and feed across the same in perfect alinement without requiring further adjustment or attention on the part of the operator. In order now to continue the reproducers in alinement when raised clear of the record, so that they may be caused to reengage therewith at the will of the operator without the necessity of adjusting them separately to the record-groove, I employ a device which will now be described.

At a point adjacent to the sound-boxes the rods 6 6^a rest in guides 16 and 17, which are spaced a definite distance apart by an interposed pin 18, forming an extensible connection between the same. The guide 16 is preferably U-shaped, as shown in Fig. 3, and while movable vertically and lengthwise of the rod is of such depth as to always engage the same. The guide 17 is shown as an annular groove of V-shaped cross-section, formed either in the pin 18 or an adjustable extension 19 thereof to receive a knife-edged cam or projection 20 of the rod 6^a, which engages therewith only when the reproducers are clear of the record, as will be later on explained. The guides are supported and given longitudinal motion relatively to the rods by an arm 21, which is pivoted at 22 upon the bracket 15 and may be connected directly

with the pin 18 or indirectly therewith through an interposed L-shaped lever 23. I preferably employ the lever 23 as a convenient means of raising and lowering the reproducers. As shown, it is formed in two parts hinged together at 24, one part thereof being rigidly secured to the pin 18 and the other part pivoted to the arm at 25. A friction-disk 26, of leather or other material, serves to hold the lever 23 in any position to which it may be adjusted—as, for example, when thrown over, as indicated by dotted lines in Fig. 4, to elevate the reproducers above and clear of the record. Other devices may obviously be substituted for the lever 23 as a means of yieldingly supporting the reproducers.

As above stated, the arcs described by the engaging points of the reproducers in moving across the record are substantially concentric, and the alinement of these points relatively to the record-groove when out of engagement therewith is effected by causing the reproducer 4^a when moving in either direction from the high point 27 of the arc, as indicated by the arrows in Fig. 1, to advance at a slightly-increased speed over that of the reproducer 4. This movement is obtained automatically through the action of the cam 20 in coöperating with the guide 17, the difference in the arcs of travel of the cam and guide being such as to cause the guide to move lengthwise of the rod 6^a, and thereby traverse the knife-edged cam, which is given suitable shape or curvature to advance the reproducer 4^a as required.

It will be observed that the arrangement of parts is such that either reproducer may be lifted out of its guide without disturbing the other and replaced with equal readiness.

The guides serve to hold the reproducers in definite relation and automatically adjust the same to maintain them operatively alined relatively to the record-groove from the moment they are lifted clear of the record until they are again lowered into engagement therewith, and thereupon the guide 17 becomes disengaged and the reproducers are free to move independent of each other in following the undulations of the record-groove. When thus adjusted, the reproducers are supported by the record; but the side lugs upon the guide 16 remain in engagement with the rod of reproducer 4, and through this connection the guides are given a follow-up motion relatively to the reproducers and are therefore always in position to reengage when the lever 23 is thrown over. While the guides may be so arranged as to allow the reproducers to enter or leave the record-groove simultaneously, I preferably provide for giving the reproducer 4 a slight advance over the reproducer 4^a, as the former is steadier, owing to the form of guide employed in connection therewith.

The stylus-arm 28 is socketed at 29 in the usual manner and provided with a set-screw 30 for securing the needle 31 therein.

The operation, advantages, &c., of my invention will be apparent from the foregoing description.

Having thus described my invention, I claim—

1. A polyphone comprising a sound-record, a plurality of reproducers coöperating therewith, and means connecting the reproducers and operating substantially parallel with the face of the record to adjust and maintain the reproducers in such position that their styluses track in the same record-groove.

2. A polyphone comprising a sound-record, a plurality of reproducers movable independently of each other and means for transmitting requisite motion from one reproducer to the other to maintain them in operative alinement.

3. A polyphone comprising a disk sound-record, a plurality of reproducers, and requisite guides movable with the reproducers for maintaining them in alinement relatively to the record when out of engagement therewith.

4. A polyphone comprising a sound-record, a plurality of reproducers, and means for effecting an automatic adjustment of the reproducers toward and from each other.

5. A polyphone comprising a sound-record, a plurality of reproducers coöperating therewith, a support common to the several reproducers for moving them in and out of engagement with the record, and means carried by the reproducers for automatically adjusting them toward and from each other.

6. A polyphone comprising a sound-record, a plurality of reproducers coöperating therewith, a cam and a cam-engaging device mounted respectively upon adjoining reproducers and arranged to cause said reproducers to move in such direction as to maintain them in operative alinement.

7. A polyphone comprising a sound-record, a plurality of reproducers coöperating therewith, requisite guides for the reproducers, and a cam coacting with the guides to effect an automatic adjustment of the reproducers.

8. A polyphone comprising a sound-record, a plurality of reproducers, requisite guides movable with the reproducers, and a cam co-operating with the guides to effect an automatic adjustment of one of the reproducers.

9. A polyphone comprising a sound-record, two reproducers normally disconnected during their reproducing movement, means for raising and lowering the reproducer, and means for positively connecting the reproducers when raised clear of the record.

10. A polyphone comprising a disk sound-record, a plurality of reproducers coöperating therewith, an arm movable with the reproducers, requisite guides carried by the arm,

and means for adjusting the guides to raise and lower the several reproducers relatively to the record.

5 11. A polyphone comprising a disk sound-record, two reproducers coöperating therewith, a movable arm operatively connected with one of the reproducers, guides carried by the arm, and a cam coacting with the guides to effect an automatic adjustment of the other reproducer.

10 12. A polyphone comprising a rotatable sound-record, two reproducers coöperating therewith, said reproducers being movable horizontally in substantially concentric arcs, 15 a pivoted arm operatively connected at its free end to one of the reproducers, guides for retaining the reproducers in definite relation, and means carried by the arm for moving the guides to raise or lower the several reproducers.

20 13. A polyphone comprising a rotatable sound-record, two reproducers coöperating

therewith, requisite guides for the reproducers, a support for the guides, an adjustable connection interposed between the guides 25 and the support, and a cam coacting with the guides to effect an automatic adjustment of the reproducers relatively to each other.

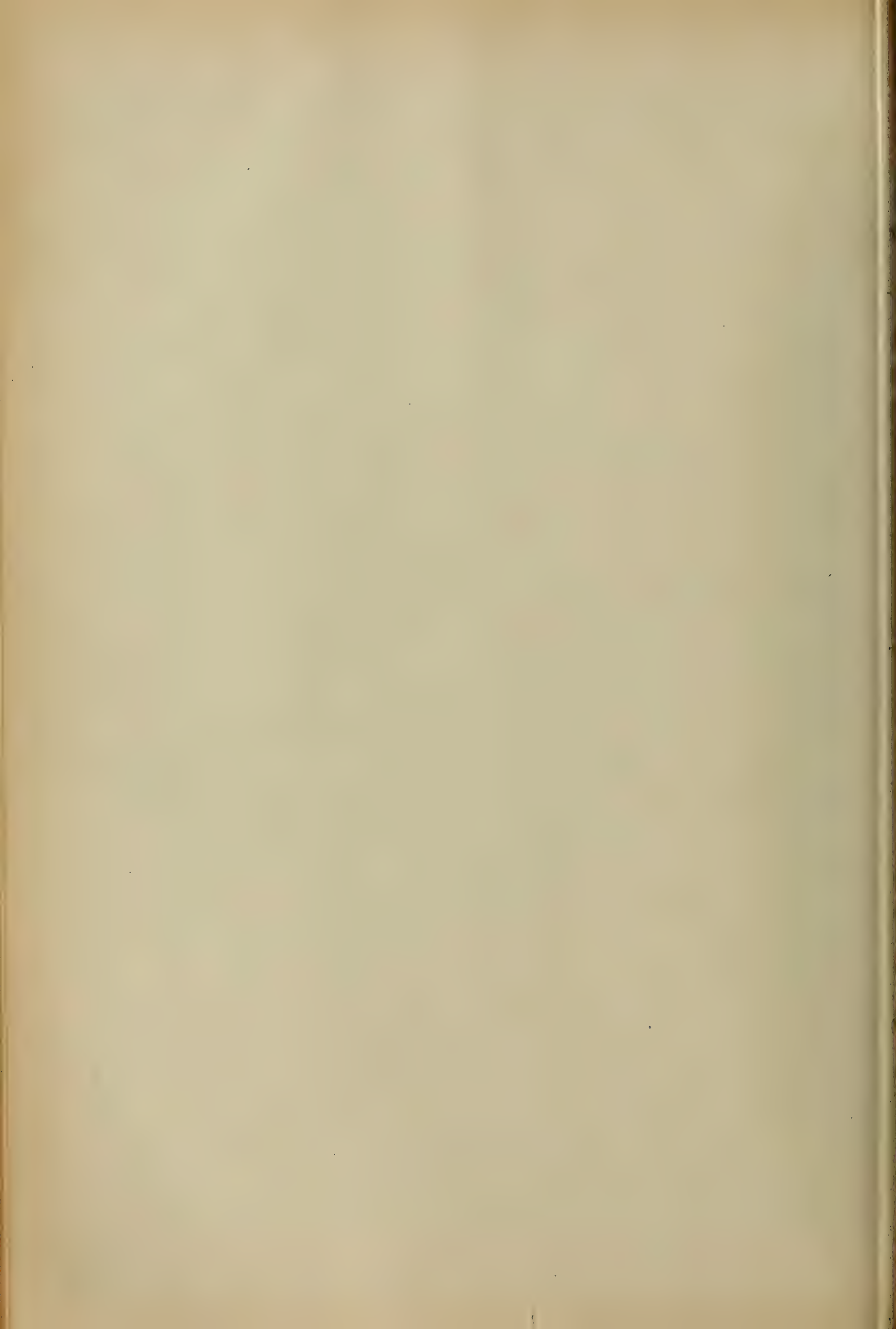
14. A polyphone comprising a sound-record, two reproducers normally disconnected 30 during their reproducing movement, means for raising and lowering the reproducers, means for positively connecting the reproducers, and a device coacting with said connecting means to give the reproducers mo- 35 tion toward and from each other.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of March, 1905.

HENRY J. HAGEN.

Witnesses:

M. TURNER,
W. H. PUMPHREY.

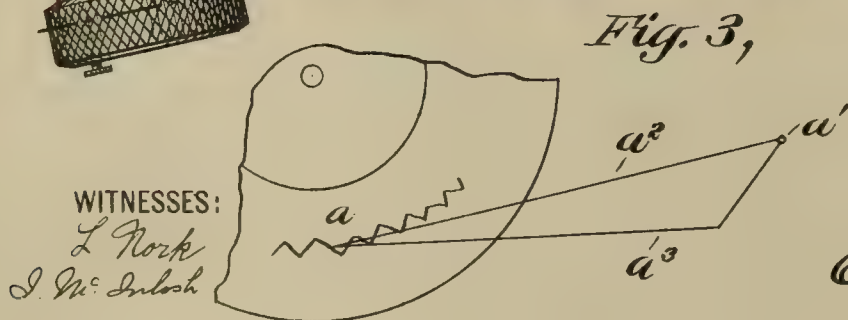
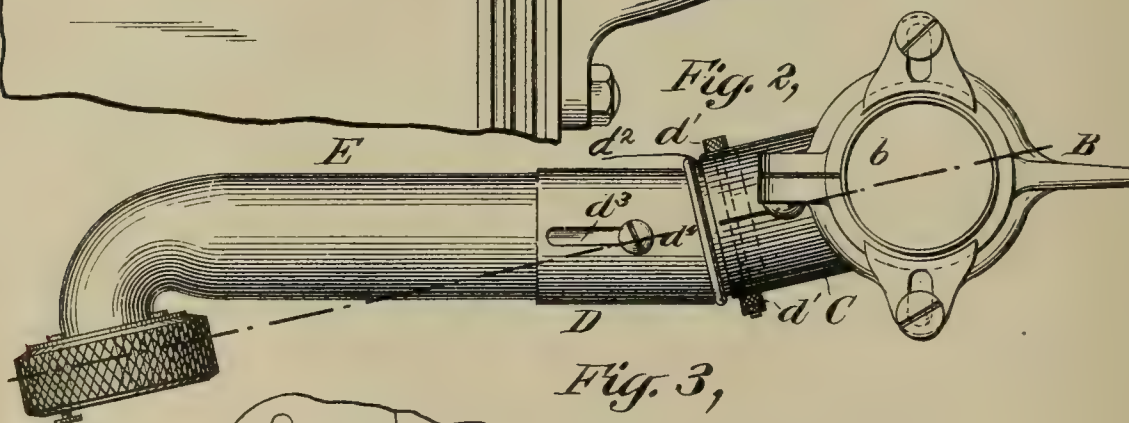
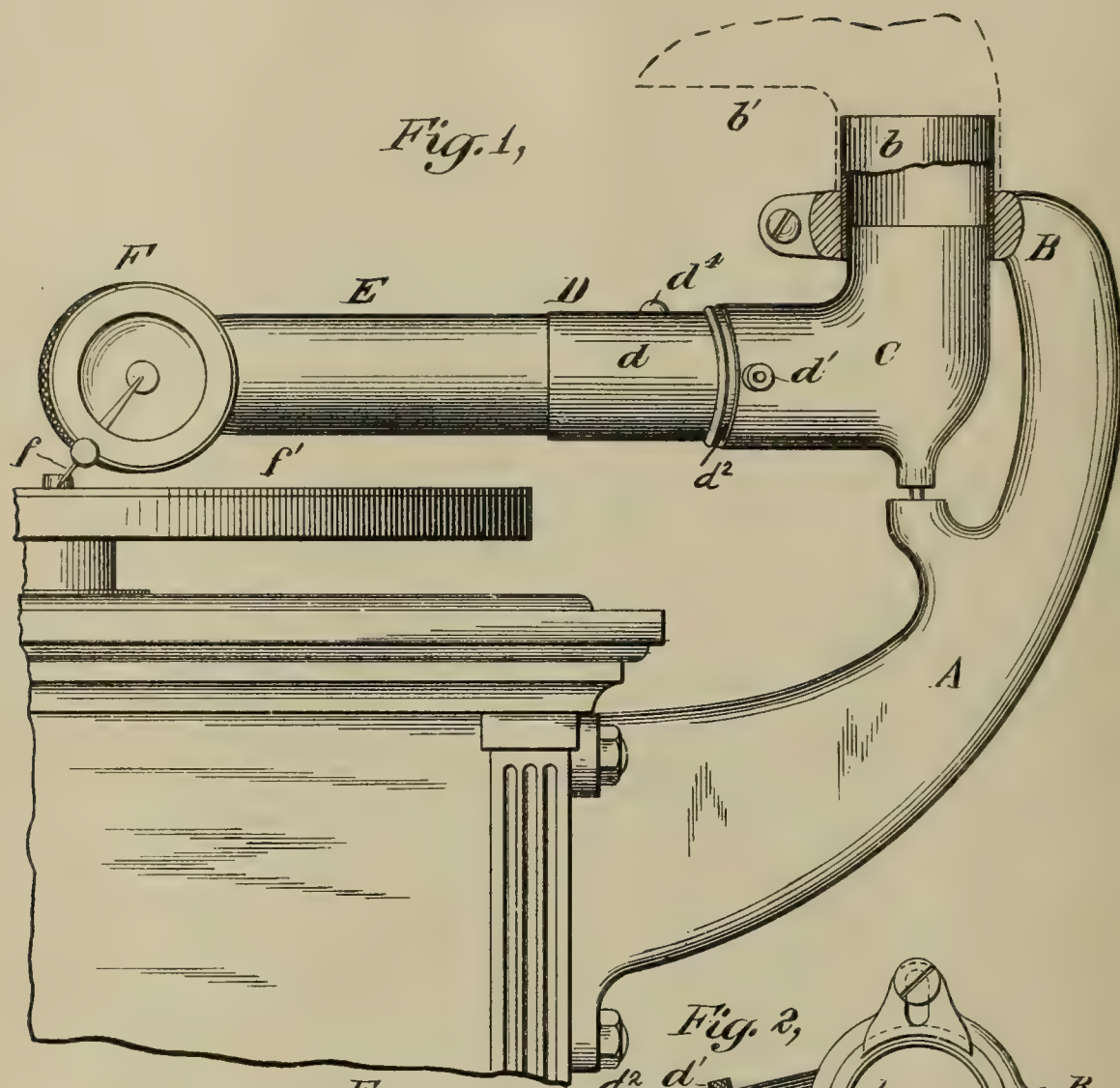


No. 816,995.

PATENTED APR. 3, 1906.

E. A. PANCOAST.
TALKING MACHINE.

APPLICATION FILED APR. 12, 1905.



WITNESSES:
L. Hork
J. W. Inlosh

INVENTOR

E. A. Pancoast
BY
J. P. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWIN A. PANCOAST, OF MONTCLAIR, NEW JERSEY, ASSIGNOR OF ONE-THIRD TO ELLSWORTH A. HAWTHORNE, OF SPRINGFIELD, MASSACHUSETTS, ONE-THIRD TO HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, AND ONE-THIRD TO JOHN O. PRES-COTT, OF MONTCLAIR, NEW JERSEY.

TALKING-MACHINE.

No. 816,995.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed April 12, 1905. Serial No. 255,123.

To all whom it may concern:

Be it known that I, EDWIN A. PANCOAST, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The object of the invention is to improve the construction and increase the efficiency of talking-machines of the disk type with respect chiefly to the reproducing feature thereof.

The invention is based upon the theory that in the practice of the art on the lines heretofore followed faulty reproduction results from the failure of the style to freely track in the record. In addition to faulty reproduction this results also in unnecessary friction and wear both upon one side of the style and upon the corresponding side of the groove in which it operates. In overcoming these defects in preëxisting structures I so construct and arrange the support for the reproducing-style (such as the sound-box, the tone-arm, or the bracket in which the latter is mounted) as that the same shall operate freely in the record-groove and freely and faithfully follow its sinuosities without the objectionable friction above referred to and with a marked improvement in the quality of the reproduced sounds.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view, partly in section, of a portion of a talking-machine, illustrating my invention. Fig. 2 is a plan view of the sound-box, tone-arm, and its support as shown in Fig. 1; and Fig. 3 is a diagrammatic view hereinafter referred to.

Referring to the drawings, in which similar letters denote corresponding parts, A designates the supporting-bracket for the tone-arm and sound-box. This is provided at its upper end with an adjustable annulus B, carrying the collar *b*, which coacts with the end of the reproducing-horn *b'*.

C designates a tubular elbow having a pin-and-socket support in the bracket A and communicating with the interior of the collar *b*.

D designates a two-part sleeve, one part *d*² whereof is of such size as to telescope within

the end of the tubular elbow C, where it is pivotally supported by pins or screws *d'*. The other part *d* is arranged at an angle to the part *d*² and is preferably slotted at *d*³ to receive a set-screw *d*⁴, whereby the end of the tone-arm E, telescoped within such part *d*, may be detachably secured in position.

The sound-box F may be of any desired construction, and its plane may be parallel with the axis of the tone-arm E, or, as shown in Fig. 2, at an angle thereto. The latter is preferred, as it is thereby possible to arrange the style in direct alinement with the center upon which the pull of such style falls. It is provided with the usual reproducing-style *f*, coacting with the groove in the record-disk *f'*.

In Fig. 3 I have illustrated diagrammatically the structure above described in its relation to the record-groove. Such groove, comprising lateral undulations, opposes the free movement of the style therein to a degree governed largely by the angles of the lateral undulations and the point of support of the tubular elbow or other device whereby (indirectly) the reproducing-style is carried. Such opposition, besides throwing unnecessary friction and wear on both the style and the record-groove, precludes the faithful tracking of the style, and the result is imperfect reproduction. In the construction herein disclosed this is overcome, or at least minimized, by the mounting of the tone-arm at an angle to the tubular elbow by which it is supported. Thus in said figure, in which an exaggerated record-groove is illustrated, *a* indicates the point of coaction of the style and the groove, and *a'* indicates the pivotal point of the elbow. The line *a*² indicates the direction of the pull on the point *a'* in the mechanisms heretofore employed. Theoretically the further movement of the record is blocked. Practically, however, the angles of the undulations not being so pronounced as in the exaggerated diagram, the record continues to move, but great strain is thrown both on the groove therein and on the style, resulting in destructive wear and imperfect reproduction. The direction of pull on the point *a'*, where the angular method of mounting herein disclosed is observed, is represented by the line *a*³. Here, as will readily be understood,

no such excessive strain is thrown upon either the groove or the style. The style, sound-box, tone-arm, and tubular elbow are freely moved under the influence of the lateral undulations in the record-groove, unnecessary friction and consequent wear are eliminated, and as a direct consequence of this and of the faithful tracking of the stylus the reproduction greatly improved in purity and freedom from foreign sounds.

What I claim, and desire to protect by Letters Patent, is—

1. In a talking-machine, the combination with a movably-mounted tubular support, of a tone-arm, an angular sleeve connecting the tone-arm and said support and arranged to permit movement of the tone-arm relatively to the support, and a sound-box connected to said tone-arm, substantially as described.

2. In a talking-machine, the combination with a movably-mounted tubular support, of an angular sleeve pivotally connected to said support, a tone-arm detachably secured to said sleeve, and a sound-box connected to said tone-arm, substantially as described.

3. In a talking-machine, the combination with a movably-mounted tubular support, of

a two-part sleeve attached to said support, one of its parts being at an angle to the other part, and an attached sound-box and tone-arm, said tone-arm being secured to said sleeve, substantially as described.

4. In a talking-machine, the combination with a movably-mounted tubular support, of a two-part sleeve pivotally attached to said support, one of its parts being at an angle to the other part and an attached sound-box and tone-arm, said tone-arm being detachably connected with said sleeve, substantially as described.

5. In a talking-machine, the combination with a movably-mounted tubular support, of a two-part sleeve pivotally connected to said support, one of its parts being at an angle to the other part, a sound-box, and a tone-arm connecting the sound-box and said sleeve, substantially as described.

This specification signed and witnessed this 6th day of April, 1905.

EDWIN A. PANCOAST.

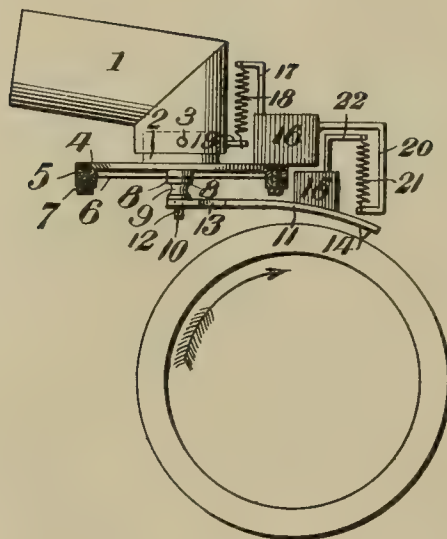
Witnesses:

S. O. EDMONDS,
L. NORK.

No. 817,062.

PATENTED APR. 3, 1906.

W. HART.
GRAPHOPHONE REPRODUCER.
APPLICATION FILED AUG. 14, 1905.



Witnesses

Thos. W. Carey.
C. H. Griesbauer.

Inventor
Wm. Hart.

by *A. B. Wilson*
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM HART, OF KIRKSVILLE, MISSOURI.

GRAPHOPHONE-REPRODUCER.

No. 817,062.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed August 14, 1905. Serial No. 274,146.

To all whom it may concern:

Be it known that I, WILLIAM HART, a citizen of the United States, residing at Kirksville, in the county of Adair and State of Missouri, have invented certain new and useful Improvements in Graphophone-Reproducers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to reproducers for graphophones, phonographs, and other talking-machines; and one of the principal objects of the same is to provide means for preventing the jarring or jolting of the stylus in passing over the sound-grooves of the record.

Another object is to provide means for varying the volume or giving greater or less amplitude to the production or record.

These and other objects are attained by means of the construction illustrated in the accompanying drawing, in which the figure is a side elevation and partial section of a reproducer made in accordance with my invention.

Referring to the drawing for a more particular description of my invention, the numeral 1 designates the horn-supporting elbow or intake of the reproducer, said elbow being supported upon a short tubular piece 2 by means of a pin 3, forming a pivot between the elbow 1 and the tube 2. The sound-box consists of a disk 4, to which the rings 5 are secured, and the diaphragm 6 is connected to the disk by means of screws 7, which pass through the disk and through the rings and hold the diaphragm in place between said rings. A hub 8 is provided with a pin or projection 9, which passes centrally through the diaphragm, and at its lower end said hub is provided with an integral projection 10, said projection passing through a hole in the stylus-lever 11 and being secured thereto by means of a pin 12. The said lever 11 is provided with a spring portion at 13, and a stylus 14 is secured to the outer end of said lever. Supported upon said lever is a weight 15, and supported upon the disk 4 is a weight 16. These weights may be secured in place by any suitable means, as by pins or small screws (not shown) passing upward through the lever 11 and through the disk 4 into the weights. Projecting upwardly from the

weight 16 is an arm 17, and secured to this arm at one end is a spring 18, the opposite end of the spring being connected to a pin 19, projecting back from the elbow or intake 1. An arm 20 depends from the weight 16, and a spring 21 is secured to the depending arm at one end, and its opposite end is connected to a bar 22, overhanging the weight 15.

From the foregoing it will be obvious that as the diaphragm is rigidly secured to a hub connected to the stylus-lever any vibration of the stylus will be directly communicated to the diaphragm and that the weights and springs connected to the stylus-lever will have a tendency to give stability to the stylus in its movement over the record and give increased amplitude to the reproduction. However, should it be desired to produce a record without giving increased volume the weights may be removed. In such condition the instrument may be used for teaching languages or for the use of a type-writer and for other purposes not requiring a loud reproduction.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a reproducer of the character described, a diaphragm, a hub secured centrally thereto, a stylus-lever connected to said hub, a horn-intake, and a tube pivotally connected to said horn-intake, and disposed above the upper end of said hub, substantially as described.

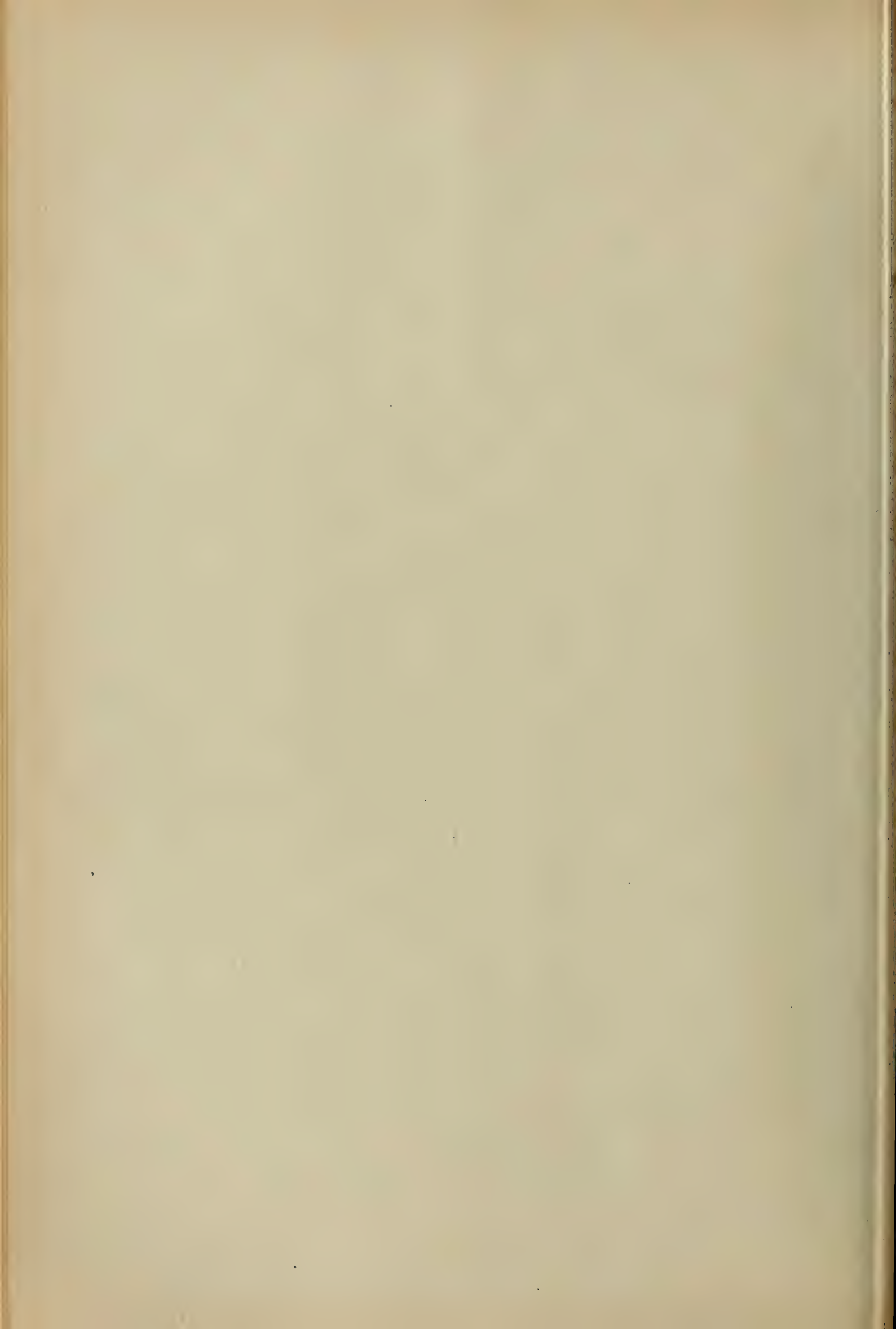
2. A reproducer for graphophones comprising a sound-box, a weight thereon, a spring connected to said weight and to the horn-intake, a weight supported upon the stylus-lever, and a spring connected to said weight at one end and having its opposite end connected to an arm depending from the first-mentioned weight, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM HART.

Witnesses:

W. J. WALL,
R. H. WHITZEL.

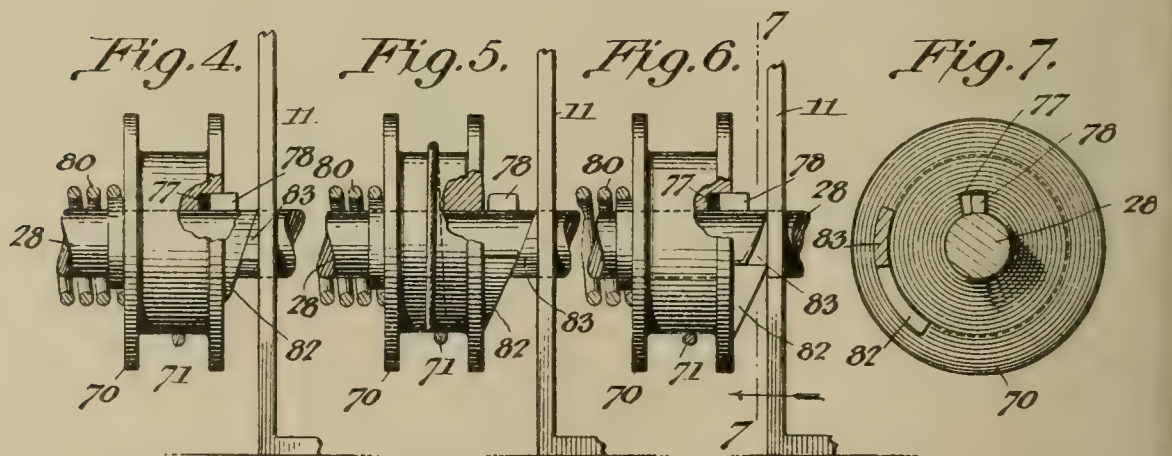
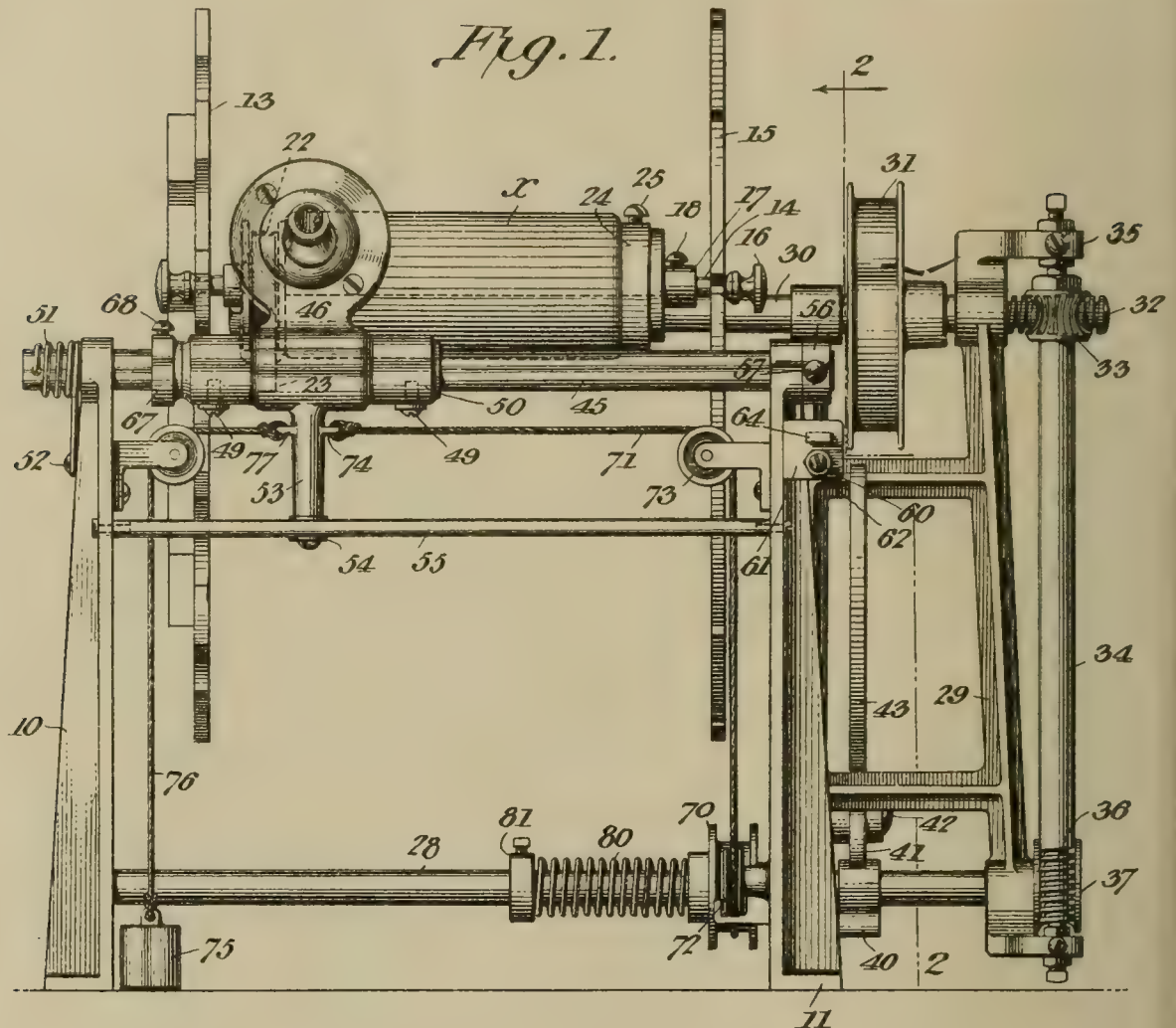


No. 817,756.

PATENTED APR. 17, 1906.

B. DUBINSKI.
PHONOGRAPH MACHINE.
APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 1.



Witnesses
E. H. Stewart
J. M. E. Porter

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No. 817,756.

PATENTED APR. 17, 1906.

B. DUBINSKI.
PHONOGRAPH MACHINE.
APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 2.

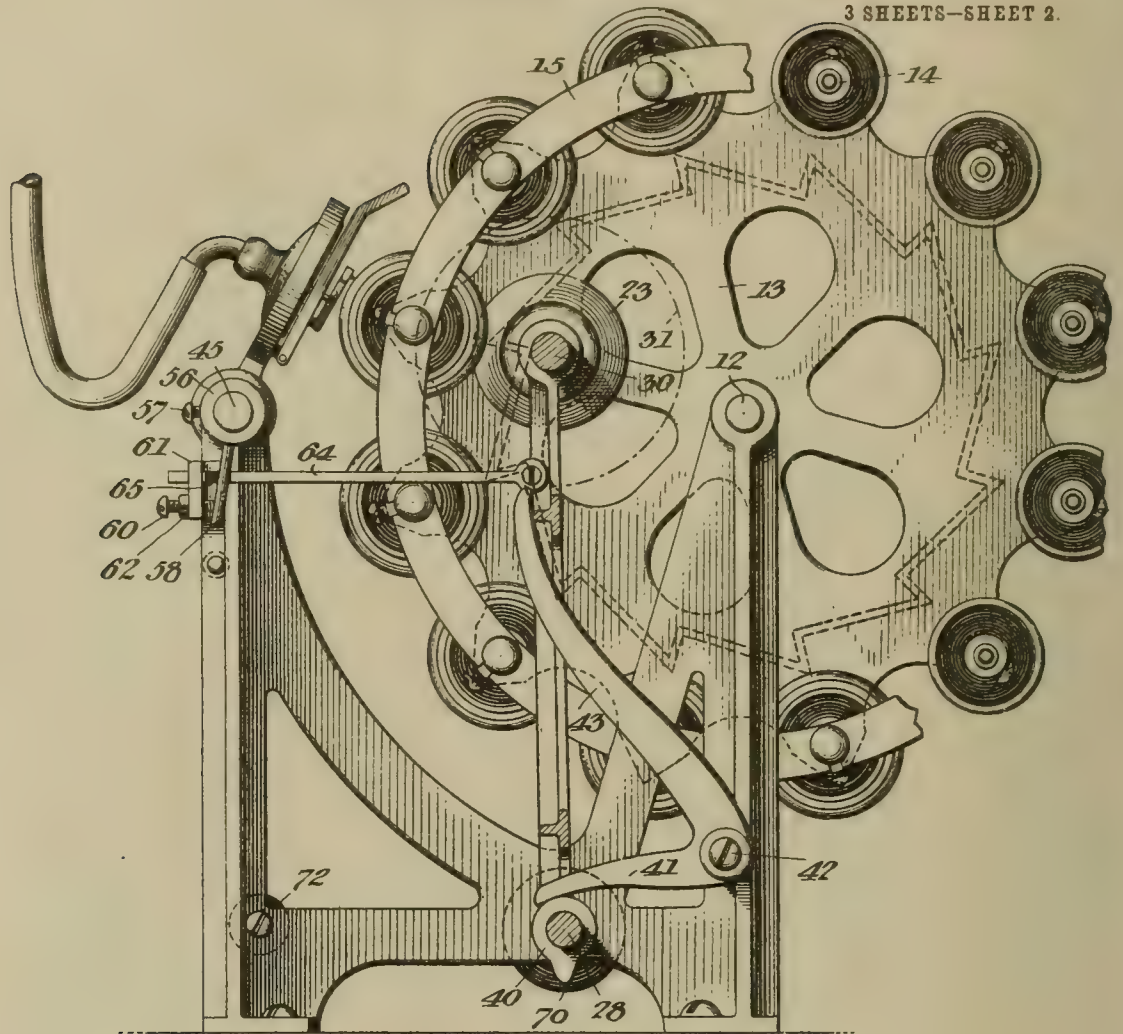


Fig. 2.

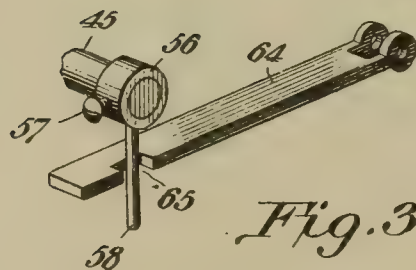


Fig. 3.

Witnesses

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B. DUBINSKI.
PHONOGRAPH MACHINE.
APPLICATION FILED JUNE 6, 1905.

3 SHEETS—SHEET 3.

Fig. 8.

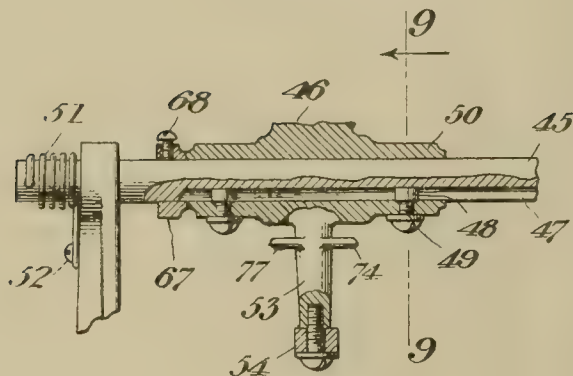


Fig. 9.

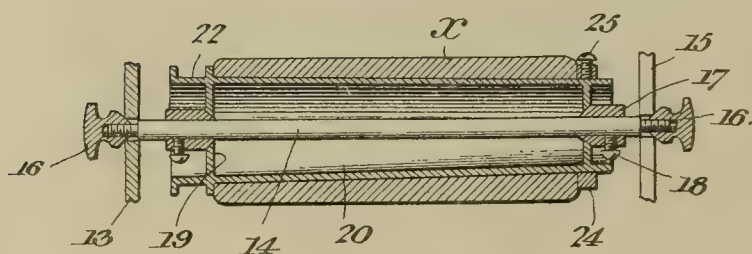
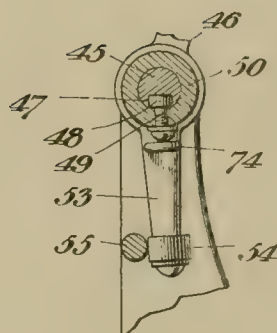


Fig. 10.

Witnesses

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Benjamin Dubinski,
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Attorneys

UNITED STATES PATENT OFFICE.

BENJAMIN DUBINSKI, OF SAN ANTONIO, TEXAS.

PHONOGRAPH-MACHINE.

No. 817,756.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed June 5, 1905. Serial No. 263,856.

To all whom it may concern:

Be it known that I, BENJAMIN DUBINSKI, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented a new and useful Phonograph-Machine, of which the following is a specification.

This invention relates to sound-reproducing machines, and especially to a machine of that general class in which a plurality of records are presented successively to a single sound-box.

The principal object of the invention is to improve and simplify the sound-box-traversing mechanism and insure uniformity of movement of the same at each operation, a further object in this connection being to provide for the movement of the sound-box away from the record at precisely the same point on each record.

A further object of the invention is to provide for the returning of the carriage to its initial or starting position after each reproducing operation and to prevent premature return movement by so constructing the mechanism that the sound-box will be moved away from the record before the latter is released and allowed to start on its return movement.

A still further object of the invention is to provide for the accurate adjustment of the position of the sound-box with relation to the record in order to prevent excessive inward movement of the sound-box and to provide means whereby the sound-box is yieldably held and is free to move outward to a greater or less extent during the reproducing operation.

A still further object of the invention is to improve the construction of the record-carriers and to provide means for locking the records from longitudinal movement on the carrying cylinders or mandrels.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing

from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a front elevation of sufficient of a sound-reproducing machine to illustrate the application of the invention thereto. Fig. 2 is an end view of the same, partly in section, on the line 2 2 of Fig. 1. Fig. 3 is a detail perspective view of a portion of the sound-box-carrying shaft and the lever for rocking the same. Fig. 4 is a detail view, partly in section, of the mechanism for traversing the sound-box carriage during the reproducing operation. Figs. 5 and 6 are similar views of the same mechanism with the parts in different positions. Fig. 7 is a sectional elevation of the same on the line 7 7 of Fig. 6. Fig. 8 is a detail sectional view of a portion of the sound-box carriage and its rock-shaft. Fig. 9 is a transverse sectional view of the same on the line 9 9 of Fig. 8. Fig. 10 is a sectional view of one of the record-carrying mandrels, showing a record in position thereon.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The present application relates to certain improvements in sound-reproducing machines of that general type shown in Letters Patent No. 773,486, granted to me October 25, 1904, and to which reference may be had for specific details of construction not shown or described in the present application.

The principal working parts of the apparatus are supported on a suitable frame, including end standards 10 and 11, that are provided with bearings for the reception of a shaft 12, that carries at one end a disk 13, to which are secured a plurality of shafts 14, said shafts extending in parallel relation with the main shaft 12 and being connected, at their opposite ends to a ring 15. The shafts are provided with reduced threaded terminals adapted for the reception of thumb-nuts 16, by which they may be firmly clamped in place, and the ring 15 is provided with slots for the passage of said shafts in order to permit the convenient introduction and removal of the latter when it is desired to change the records.

The several shafts are non-revoluble and carry sleeves 17, that may be locked in any adjusted position by set-screws 18, these

sleeves forming conical bearings which fit in suitable openings formed in end disks 19 of the record-carrying mandrels 20, the latter being tapered in form and adapted to receive records *x* of the usual construction. The larger end of the mandrel, or that end adjacent to the disk 13, is provided with a grooved friction-face 22, which is engaged by a friction driving-disk 23 in the manner herein-
 5 after described for the purpose of imparting rotative movement to the mandrel. The record is held from longitudinal movement by a sleeve or ring 24, which is placed in position over the smaller end of the mandrel
 10 and locked by means of a set-screw 25, the record being thus held from longitudinal play during the reproducing operation.

Mounted in suitable bearings in the lower portion of the frame is a horizontally-disposed shaft 28, on which is pivoted the lower end of a frame 29, and said frame is provided at its upper end with bearings for a drive-shaft 30, which extends within the annular series of record-carrying mandrels and carries the friction driving-roller 23. This shaft is provided with a grooved pulley 31, to which movement may be imparted by a suitable driving-belt. At the outer end of the shaft 30 is a worm 32, that intermeshes
 30 with a worm-wheel 33, carried by an approximately vertical shaft 34, that is supported by brackets 35, projecting from the upper and lower portions of the rocking frame 29, and at the lower end of the shaft 34 is a worm 36, that intermeshes with a worm-wheel 37 on a shaft 28, the gearing being so proportioned that shaft 30 in rotating a sufficient number of times to effect the reproduction of an entire record will effect a single
 40 rotation of the shaft 28.

Secured to the shaft 28 is a cam 40, that is adapted to engage with the lower arm 41 of a bell-crank lever that is pivoted on a stud 42, projecting from the main frame. The upper arm 43 of the bell-crank lever extends through the rocking frame 29 and engages a cross-bar on said frame, so that when the shaft 28 turns the cam 40 to proper position and operates on the arm 41 of the bell-crank lever the rocking frame 29 will be drawn to the rear and the friction driving-pulley 23 will be forced out of engagement with the friction-pulley of the record-mandrel, and when the parts are in normal position—that is to say, with the sound-box out of contact with the records and at its initial starting-point—the projecting active surface of the cam 40 will hold the arm 41 of the bell-crank lever in elevated position, and the rocking frame will be in its rearmost position with the driving-pulley 23 inoperative. The starting of the machine due to the insertion of a coin or the operation of a push-button or the like imparts rotative movement to the

shaft 30, and this movement transmitted through the worm-gearing to the shaft 28 causes cam 40 to move from the bell-crank lever 41, and the latter in descending allows the frame 29 to swing forward until the driving-pulley 23 engages with the friction-pulley of the adjacent record-carrying mandrel. At the completion of each recording operation the projecting surface of the cam again engages the arm 41 and the rocking frame is moved back to inoperative position. The details of this mechanism, which form no part of the present invention, are fully described and illustrated in the Letters Patent hereinbefore referred to.

At the upper front portion of the machine is a rock-shaft 45, that is held in suitable bearings in the main frame and serves as a support for the sound-box carriage 46. This shaft is provided with a groove 47, that extends for practically the entire length of the shaft and is adapted for the reception of a pair of antifriction-rollers 48, carried by screws or studs 49, that extend through threaded openings formed in an elongated sleeve 50, that constitutes a base for the sound-box carriage. To this shaft is secured one end of a helical spring 51, which is wound around the shaft, and has its opposite end secured to a pin or scrow 52 on the main frame, the spring tending to turn the rock-shaft and force the reproducing-stylus of the sound-box against the record and said spring allowing the sound-box to yield to a greater or less extent during the reproducing of the record. Depending from the sleeve 50 is an arm 53, that carries at its lower end an antifriction-roller 54, which when the sound box is in reproducing position travels against a stationary rod 55, that extends between the standards 10 and 11 to prevent excessive inward movement of the carriage in case of accidental breakage or imperfect adjustment of other portions of the mechanism.

Secured to one end of the shaft 45 is a collar 56, which may be revolubly adjusted on the shaft and locked in adjusted position by a set-screw 57. This collar is provided with a pendent pin 58, the lower end of which engages an adjustable stop in the form of a screw 60, that extends through a threaded opening in a bracket 61, carried by the standard 11, said screw being first adjusted to proper position and then locked by a nut 62 and serving as a means for limiting rotative movement of the rock-shaft in the direction necessary to effect engagement between the reproducing-stylus and the record.

Pivotally connected to the upper portion of the rocking frame 29 is a bar 64, the outer end of which is guided in a suitable opening formed in the bracket 61, and in the outer face of the bar is a notch or recess 65, through which the pin 58 passes. This bar serves as

a means for moving the sound-box toward and from the record, and on reference to Fig. 2 it will be noted that the connection is such that when the friction-disk 23 is in operative position the sound-box is also in operative position. If the rocking frame 29 is thrown rearward to move the friction-disk 23 to inoperative position, the movement will be transmitted through the bar 64 to pin 58, and the shaft 45 will be rocked to such position as to throw the sound-box outward away from the record in a position to permit the return of the sound-box to its initial position, this position being determined by a collar 67, that is carried by the rock-shaft 45, and which may be firmly locked in any desired position of adjustment by a set-screw 68.

Mounted loosely on the shaft 28 is a grooved winding-drum 70, to which is secured one end of a flexible member 71 in the form of a cord or chain. This flexible member is guided by sheaves 72 and 73 and at its opposite end is secured to an eye formed in a lug 74, projecting from the pendent arm 53 of the sound-box carriage. When this drum is turned in one direction, the flexible member is wound thereon and the carriage is drawn lengthwise of the record during the reproducing operation. To restore the carriage to initial position, a weight 75 is connected by a suitably-guided flexible member 76 to an eye formed in a lug 77 at the opposite side of the pendent arm 53, the weight being elevated as the carriage is drawn to the right during the reproducing operation and descending to draw the carriage to the left at the completion of such operation.

The winding-drum is provided with a recess 77, which is adapted to receive a key or lug 78, projecting from the shaft 28, and said drum is constantly pressed in the direction of the key by means of a helical compression-spring 80, surrounding the shaft and bearing at one end against the drum and at the opposite end against an adjustable collar 81, carried by the shaft. On one of the flanges of the drum is a cam 82, which as the drum revolves comes into engagement with a stationary cam 83, carried by the frame, the arrangement being such that the drum will rotate a trifle less than a complete revolution at each operation, and this partial rotation will be sufficient to move the sound-box for the full length of the record.

When the parts are in normal position—that is to say, are not operating—the straight faces of the two cams or those faces parallel with the axis of the shaft 28, are in contact with each other, the stationary cam 83 acting as a stop for the cam 82, and at this time the key or lug 78 is not in the recess 77. As soon as shaft 28 commences to rotate the key or lug 78 will rotate until it is opposite the recess 77, whereupon spring 80 will force the drum

in the direction of the key and the latter will be entered in the recess, and thereafter during the remaining portion of the rotative movement of the shaft the drum will be turned and the movement will be transmitted to the sound-box carriage. As the sound-box nears the end of the record the inclined face of the cam 82 starts to ride against the inclined face of the cam 83, and at the completion of the reproduction the drum has been forced outward to such an extent that the key or lug 78 is wholly out of the recess, whereupon the weight 75 acts to return the sound-box carriage to its initial position, and previous to this operation the frame 29 has been rocked to the rear and its movement has been transmitted to the rock-shaft 45, raising the reproducing-stylus from engagement with the record, the cams 82 and 83 being so related to the cam 40 that the latter must act in advance of the cams 82 83 and positively move the sound-box outward from the record before the drum is released from the shaft. The descending movement of the weight 75 pulls the carriage to the left and at the same time rotates the winding-drum 70 in a direction opposite to that in which it turned during the reproducing operation. The movement stops when the straight face of the cam 83 engages against the corresponding face of the cam 82.

With a device constructed in accordance with this invention it is possible to produce absolutely-uniform results, the sound-box being traversed to precisely the same distance at each operation and returning to precisely the same point after each operation, and owing to the positions of the actuating-cams it is impossible for the carriage to start on its return movement until after the stylus has been moved from engagement with the record.

Having thus described the invention, what is claimed is—

1. In a sound-reproducing machine, the combination with a sound-box carriage, of a support on which said carriage is slidably mounted, a winding-drum, a flexible connection between the winding-drum and the carriage, means for operating said drum to feed the carriage in one direction, means operable on less than a complete rotation of the drum for stopping the winding operation, and means for restoring the carriage to initial position.

2. In a sound-reproducing machine, the combination with a slidably-mounted sound-box carriage, of a winding-drum, a flexible connection between the winding-drum and carriage, a drum-operating means, means operable on less than a complete rotation of the drum for stopping the winding operation, and mechanism for automatically releasing said drum from the operating means to permit un-

winding of said flexible connection as the carriage is restored to initial position.

3. The combination in a sound-reproducing machine, of a slidably-mounted sound-box carriage, a winding-drum, a flexible connection between the drum and the carriage, an operating-shaft, a clutching means between the shaft and drum, and means for disconnecting the shaft from the drum at the completion of each reproducing operation.

4. In a sound-reproducing machine, the combination with a slidably-mounted sound-box carriage, of a winding-drum, a flexible connecting means between the drum and carriage, a shaft on which the drum is loosely mounted, a clutching means between the drum and shaft, and means operable in advance of a complete rotative movement of the drum for releasing the drum from the shaft and permitting its return to initial position.

5. In a sound-reproducing machine, a slidably-mounted sound-box carriage, a winding-drum, a flexible connecting means between the drum and carriage, said drum having a recess or opening at one of its ends, a shaft on which the drum is loosely mounted, a key or lug projecting from the shaft and adapted to enter said recess, a spring tending to force the drum in the direction of the lug or key, and interengaging cams carried one by the drum, and the other by the fixed frame of the machine and serving to disconnect the drum from the shaft at the end of each reproducing operation.

6. In a sound-reproducing machine, a slidably-mounted sound-box carriage, a winding-drum, a flexible connecting means extending between the drum and the carriage, a shaft on which said drum is mounted, means for automatically clutching the drum to and releasing it from the shaft, and a cam also mounted on said shaft and controlling the movement of the carriage toward and from the records.

7. In a sound-reproducing machine, a frame, a rock-shaft carried thereby and provided with a longitudinal groove, a sound-box carriage mounted on the shaft and having a member entering such groove, an operating-shaft, and means operated from said shaft for traversing the carriage lengthwise of the shaft during the reproducing operation, and for rocking said rock-shaft to move the sound-box away from the record at the completion of the reproducing operation.

8. In a sound-reproducing machine, a sound-box carriage, a support on which said carriage is slidably mounted, said support being movable to adjust the sound-box to operative and inoperative positions, and a single shaft operatively connected to the carriage and its support and serving to move the carriage to reproducing position at the beginning of an operation; to traverse the car-

riage along the record, and to move the carriage away from the record at the completion of the reproducing operation.

9. In a sound-reproducing machine, a sound-box carriage, a support on which the carriage is slidably mounted, a record-carrying mandrel having a friction-pulley, a movable frame, a friction driving-pulley supported thereby, and means connecting said movable frame to the carriage-support, whereby on movement of the driving-pulley into contact with the mandrel-pulley, the sound-box will be moved in the direction of the mandrel, and on disconnection of the friction-pulleys, the sound-box will be moved away from the mandrel.

10. In a sound-reproducing machine, a rock-shaft, a sound-box carriage slidably mounted thereon but held from independent rotative movement, a spring connected to the rock-shaft and tending through said shaft to force the sound-box in the direction of the record, and an adjustable means for limiting the extent of such movement.

11. In a sound-reproducing machine, a rock-shaft, a sound-box carriage free to slide thereon but held from independent rotative movement, a spring tending to move the sound-box in the direction of the record, a sleeve adjustably secured to the rock-shaft, a pin or arm extending from said sleeve, and an adjustable stop for engaging said pin or arm to limit the movement of the sound-box in the direction of the record.

12. In a sound-reproducing machine, a rock-shaft, a sound-box, a carriage slidably mounted thereon, but held from independent rotative movement, a spring tending to move the sound-box in the direction of the record, an adjustable sleeve secured to the shaft, a pin or arm depending from said sleeve, an adjustable stop for limiting the movement of the pin or arm, a rocking frame, a record-mandrel-driving pulley carried by the frame, and a bar pivotally connected to the frame and having a notch or recess in which said pin or arm is entered.

13. In a sound-reproducing machine, the combination with a rock-shaft having a longitudinal slot, of a sound-box carriage including a sleeve through which the rock-shaft passes, antifriction-rollers carried by the sleeve and entered in said slot, an arm depending from the sleeve, a rigid bar, an antifriction-roller carried by the arm and serving by engagement with said rigid bar to limit movement of the carriage in one direction, a spring acting on the rock-shaft and tending to throw the sound-box in the direction of the record, an adjustable collar carried by the rock-shaft, a pin or arm depending from said collar, an adjustable stop engaging said pin or arm to limit movement of the sound-box in the direction of the record, a rocking frame, a record-mandrel-driving pulley sup-

ported by the frame, a bar pivoted to said
frame and having a notch or recess in which
said pin or arm is entered, a shaft on which
the rocking frame is mounted, and a wind-
5 ing-drum carried by said shaft and having a
flexible connection with the pendent arm of
the carriage.

In testimony that I claim the foregoing as
my own I have hereto affixed my signature
in the presence of two witnesses.

BENJAMIN DUBINSKI.

Witnesses:

JOSEPH NEW,

CHARLES HASPOLE.



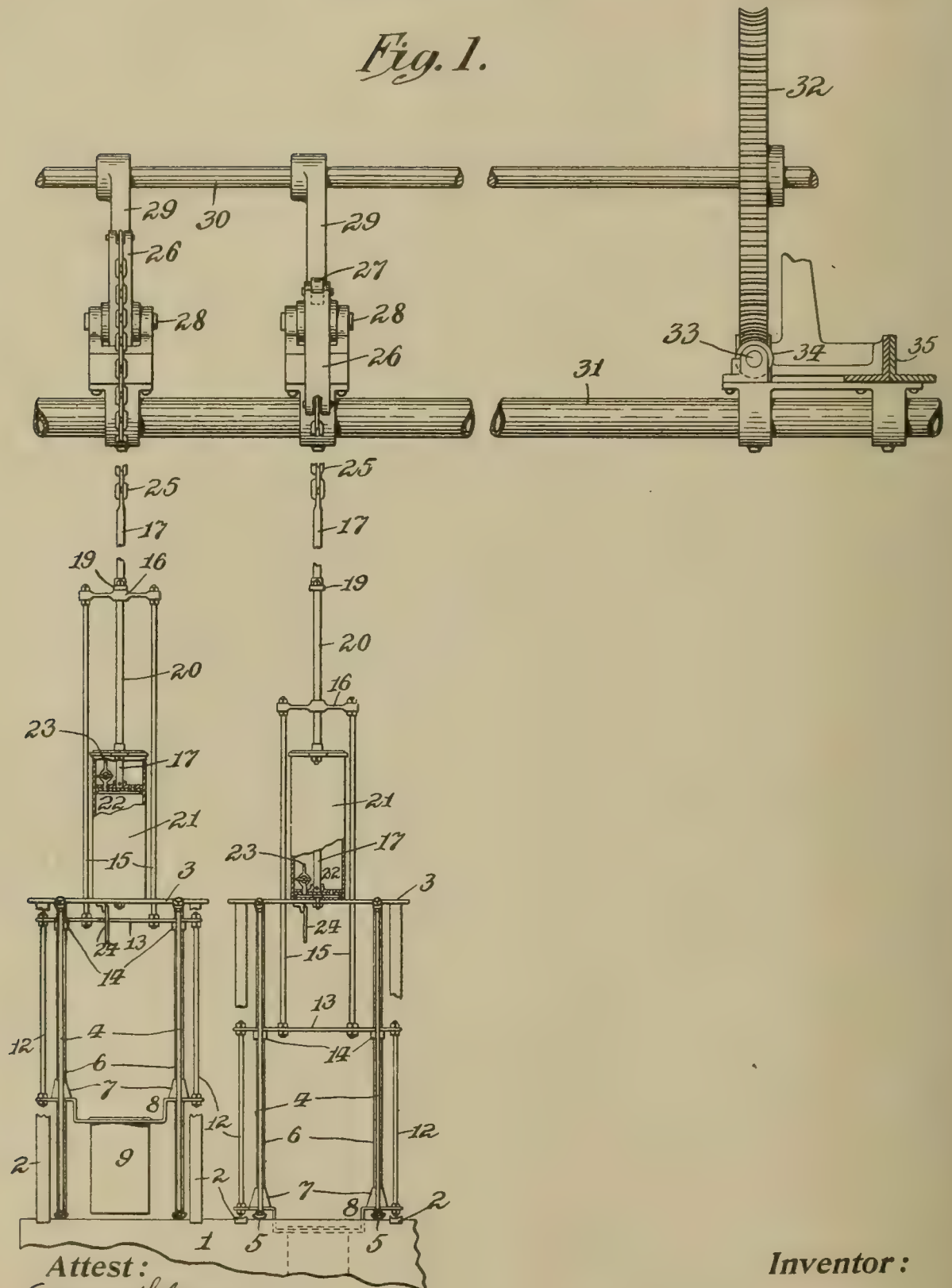
No. 817,831.

PATENTED APR. 17, 1906.

E. L. AIKEN.
MOLDING APPARATUS.
APPLICATION FILED MAR. 23, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



Attest:
Edgeworth McKim
Deputy Notary

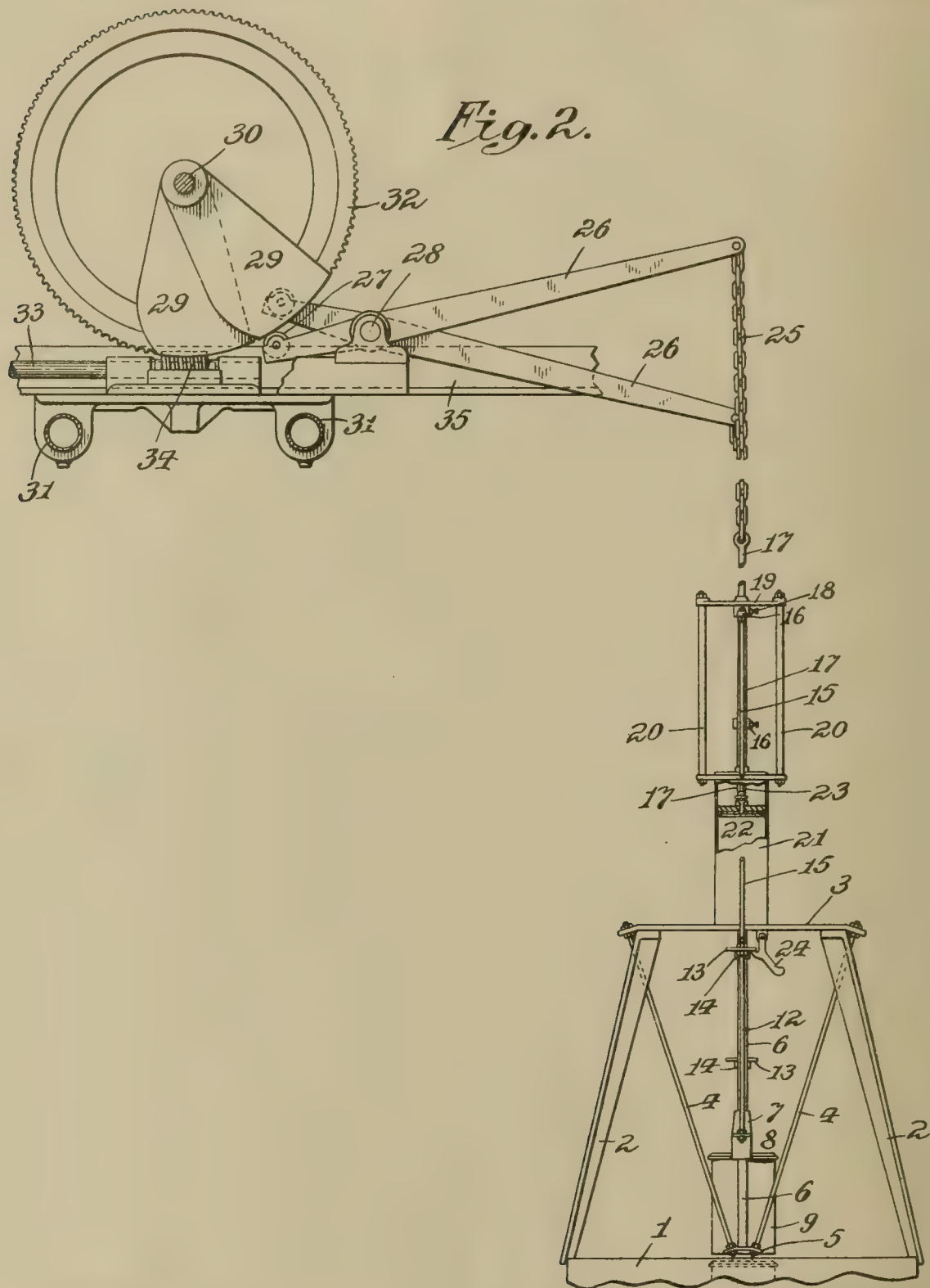
Inventor:
Edward L. Aiken
by *Frank L. Ayer* Atty.

No. 817,831.

PATENTED APR. 17, 1906.

E. L. AIKEN.
MOLDING APPARATUS.
APPLICATION FILED MAR. 23, 1905.

2 SHEETS—SHEET 2.



Attest:
Edgworth Greene
Deputy Notary

Inventor:
Edward L. Aiken
by *Frank L. Aiken* Atty.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MOLDING APPARATUS.

No. 817,831.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed March 23, 1905. Serial No. 251,662.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Molding Apparatus, of which the following is a description.

My invention relates to apparatus for use in the molding of phonograph-records, and preferably the molding process described in Patent No. 683,615, granted October 1, 1901, to Walter H. Miller and Jonas W. Aylsworth, wherein a hollow cylindrical mold bearing upon its interior surface a phonographic record in relief is dipped into molten material suitable for forming records, so that the wax or wax-like material congeals and forms a deposit upon the bore of the cylinder, whereupon the mold is then raised out of the tank containing the molten material and the congealed wax is reamed out while still warm. The mold being then chilled, the record contracts and may be drawn out from the mold by a relative longitudinal movement without injury to the record-groove.

In apparatus used heretofore for supporting the molds and raising and lowering the same it is common to support six mold-carriers side by side above a long tank, so that one operator can attend to the operation of six molds. The operation of such apparatus is as follows: The mold being in position to be lowered into the tank, the mold-carrier is allowed to descend by its own weight, slow and uniform motion being obtained by means of a dash-pot. The operator passes to the next mold, which has been immersed in the molten material the proper length of time to form a record, and raises the same by means of a rope passing over a pulley, the mold-carrier being held in its proper position by a sustaining-hook. The operator then removes the mold from the carrier, inserts a fresh mold, and releases the mold-carrier, allowing the same to descend, as before described. He then passes on to the next mold-carrier, which is in its lowered position, and repeats the operations just described. In this manner he finishes up the row of six mold-carriers, and upon his return to the first a sufficient length of time has elapsed for the molding or congealing of the wax in the first mold, and the

entire apparatus is in condition for a second cycle of operations exactly similar to the first. This manner of operating a molding apparatus requires a considerable expenditure of labor in raising the mold-carriers, so that after several hours of work operators do not generally work as rapidly as at first and the quantity of work turned out within a given time is diminished even though the slowing up of the operator may be so slight as not to be noticeable. Furthermore, an indolent operator is at any time able to greatly reduce the number of records which the apparatus is capable of producing within a given time without the slowing up being very apparent.

It is the object of my invention to provide an apparatus which will either produce the greatest possible number of records within a given time or else will indicate that it is not being operated at full capacity.

Reference is hereby made to the accompanying drawings, in which the same reference-numerals indicate corresponding parts in both views, of which—

Figure 1 is a side elevation, partly in section, of one form of device in which my invention may be embodied; and Fig. 2 is a front elevation, partly in section, of the same.

In the apparatus shown 1 is a tank of any suitable form for containing molten material from which the records are to be formed. This tank supports the legs or standards 2 of the dipping apparatus, said legs or standards carrying a top plate or frame 3 at their upper ends. Extending downwardly from the top frame are rods 4 4 at each side, connected together at their lower ends by plates 5. Guide-rods 6 extend between the plates 5 and the top frame 3. Mounted to slide longitudinally of the guide-rods 6 are sleeves 7 7, formed on a yoke 8, having a central opening therein for receiving a dipping-can 9. Connecting-rods 12 extend between the yoke 8 and an upper yoke 13, formed with sleeves 14, also movable on the guide-rods 6. Extending upwardly from the yoke 13 are connecting-rods 15, secured together at their tops by a cross-head 16, through which extends a rod 17, adjustably connected with the cross-head by a set-screw 18. The rod 17 is guided in a bearing by a stationary yoke 19, supported by standards 20 from the

top of a dash-pot cylinder 21. A piston 22 works in this cylinder and connects with the lower end of the rod 17. This piston is provided with a petcock 23, which may be

opened more or less to regulate the descent of the cylinder.

The rod 17 is connected by means of a chain or coupling 25 with one end of a lever 26, which is pivoted at 28 to a suitable support 31 and carries at its inner end a roller 27 for engagement with a cam 29. A cam-shaft 30 extends parallel to the row of mold-carriers, and a cam is provided for elevating each of said carriers. Therefore for a set of six mold-carriers there will be six cams, and in order that the proper cycle of operations may take place each cam will be placed on the shaft at a different angle, so that they will operate successively in regular sequence and at regular intervals of time. Thus when six cams are used they will be placed sixty degrees apart around the shaft. It is immaterial in what order the several cams operate so long as they operate successively and at regular intervals.

The shaft 30 is rotated slowly at a constant speed by means of any suitable mechanism. I have shown for this purpose a driving-shaft 33, which may be driven by an electric motor. The said shaft is provided with a worm 34, which meshes with the worm-wheel 32 on the shaft 30. A cross-beam 35 is provided as an additional support.

Each of the cams 29 is so formed that it raises the mold-carrier with a slow practically uniform motion from its lowest to its highest position. It then holds the same in the latter position for a fixed length of time, which is usually sufficient to enable the operator to remove the filled mold from the carrier and replace the same by a new empty mold. While this operation is going on the next mold-carrier is being raised, and just as it reaches its highest position the first cam passes the roller and allows the first mold-carrier to descend of its own weight.

Depending from the top frame or plate 3 is a latch 24, which swings rearwardly to allow the yoke 13 to ascend slightly above the latch, but which engages the same upon its descent and holds the mold-carrier in an elevated position until the operator is ready for the mold to be immersed, whereupon it is only necessary to withdraw the latch and permit the parts to descend by gravity. Ordinarily the operator releases the carrier as soon as it reaches the latch in its descent; but occasionally some extra time is needed. In this case the carrier is held up by the said latch while the operator arranges the new mold; but if so much time elapses that the operator has to pass on to the next mold the first mold-carrier must remain elevated for an entire cycle of operations, since the time remaining would not be sufficient for form-

ing a perfect record in the first mold by the time at which it will be elevated by the cam-shaft.

It is sometimes desirable that the latch be removed or held in such a position that it will not intercept the yoke 13 in its descent. In this case the operator must of course replace the filled mold with an empty one while the mold-carrier is held in its elevated position by the cam, since the carrier will descend as soon as the roller 27 passes the cam. The advantage of this method of procedure is that absolute uniformity in the time and duration of the immersion of each mold is secured. The operator is thus relieved of the labor of raising the molds and can therefore work more rapidly at his other duties. Furthermore, the time formerly occupied in raising the molds is all saved, since the operator is able to work on one mold while its successor is being raised. The speed of the shaft 30 is so regulated as to allow the operator just enough time to perform the necessary work. It is impossible for him to slight the work, because if he should allow a filled mold to descend into the tank instead of a fresh empty mold the mold would become choked with material, which would of course furnish evidence that negligence had occurred. On the other hand, if the operator allows the hook 24 to hold the mold elevated so that it will not descend into the tank it will be necessary for him to leave the mold in its elevated position for an entire cycle of operations, because if he should allow it to descend too late there would not be time enough for a record to be formed in the mold at the time the cam effects the elevation thereof. It is obvious, therefore, that by means of my invention the molding apparatus can be operated at its full capacity and that if it is not so operated the fact will be at once apparent to an observer.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, and driven means for raising each of said mold-carriers, said means operating to raise the mold-carriers in regular sequence, substantially as set forth.

2. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions and driven means for raising each of said mold-carriers, said means operating to raise the mold-carriers in regular sequence and to hold the same in elevated positions for intervals which are shorter than the periods of depression, substantially as set forth.

3. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, and driven means for raising each of said mold-carriers in regular se-

quence and for sustaining the same in its elevated position for a short period of time, said means operating to raise one carrier while the preceding carrier is in an elevated position, substantially as set forth.

4. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, releasable means for holding each of said carriers in an elevated position, and driven means for raising said mold-carriers in regular sequence and sustaining the same in their elevated positions for a short period of time, substantially as set forth.

5. In a molding apparatus, the combination of a mold-carrier and means for intermittently raising and lowering said mold-carrier, said means operating to hold the mold-carrier in an elevated position for an interval which is shorter than the period of depression, substantially as set forth.

6. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, and driven means for raising and sustaining each of said mold-carriers in regular sequence, the periods of depression being greater than the periods of elevation, substantially as set forth.

7. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, and a driven cam-shaft for elevating each of said mold-carriers and holding the same in its elevated position for a fixed interval of time, the cams being placed at different angles on the shaft so as to raise the mold-carriers in regular sequence, substantially as set forth.

8. In a molding apparatus, the combination of a series of mold-carriers occupying depressed positions, a driven cam-shaft for elevating each of said mold-carriers and holding the same in its elevated position for a fixed interval of time, the cams being placed at different angles on the shaft so as to raise the mold-carriers in regular sequence, and the surfaces of said cams overlapping in such a manner that the lifting operation of one cam takes place during the holding operation of the preceding cam, substantially as set forth.

This specification signed and witnessed this 21st day of March, 1905.

EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER

No. 817,868.

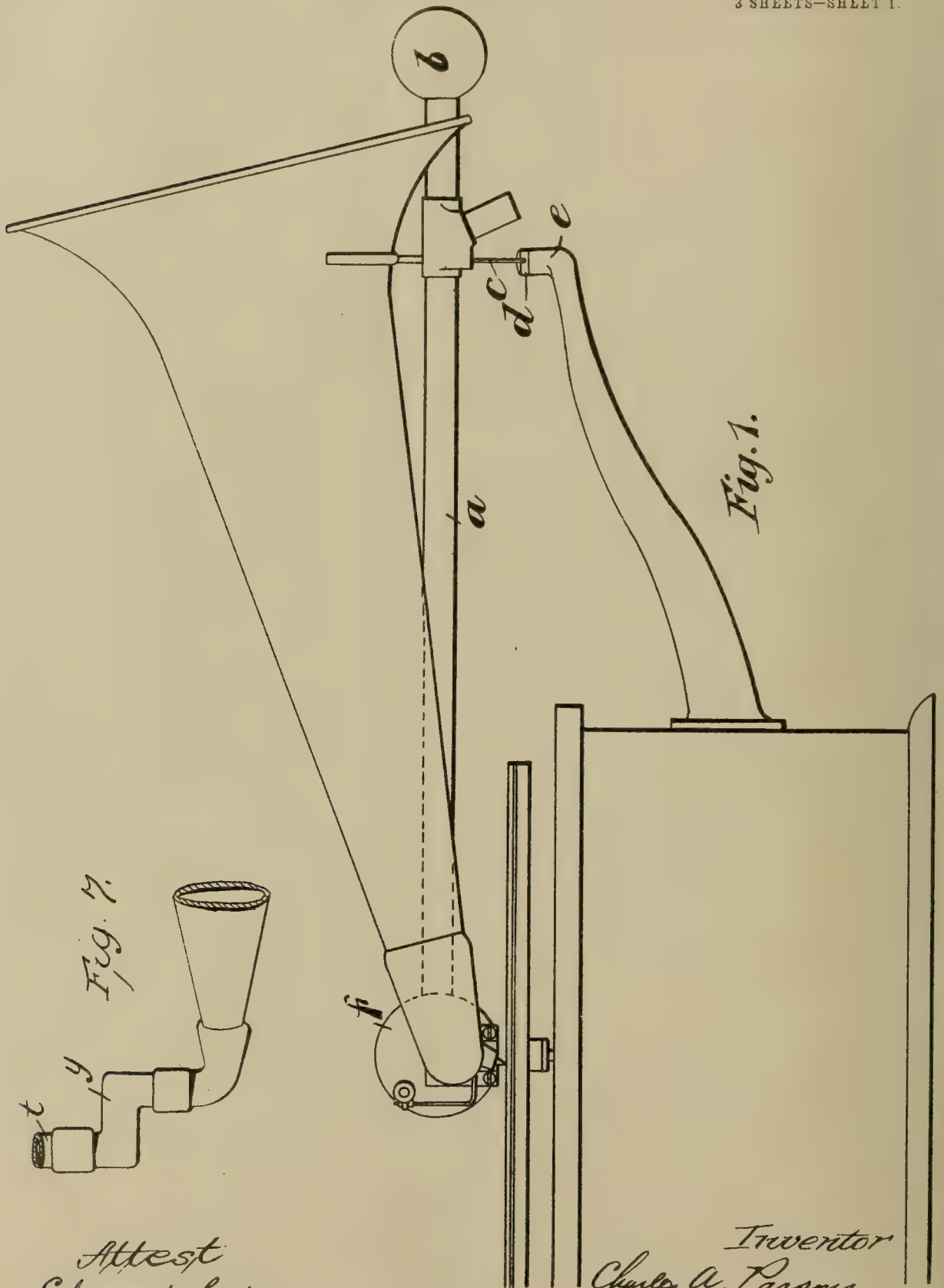
PATENTED APR. 17, 1906.

C. A. PARSONS.

SOUND REPRODUCER OR INTENSIFIER APPLICABLE TO PHONOGRAPHS,
GRAMOPHONES, &c.

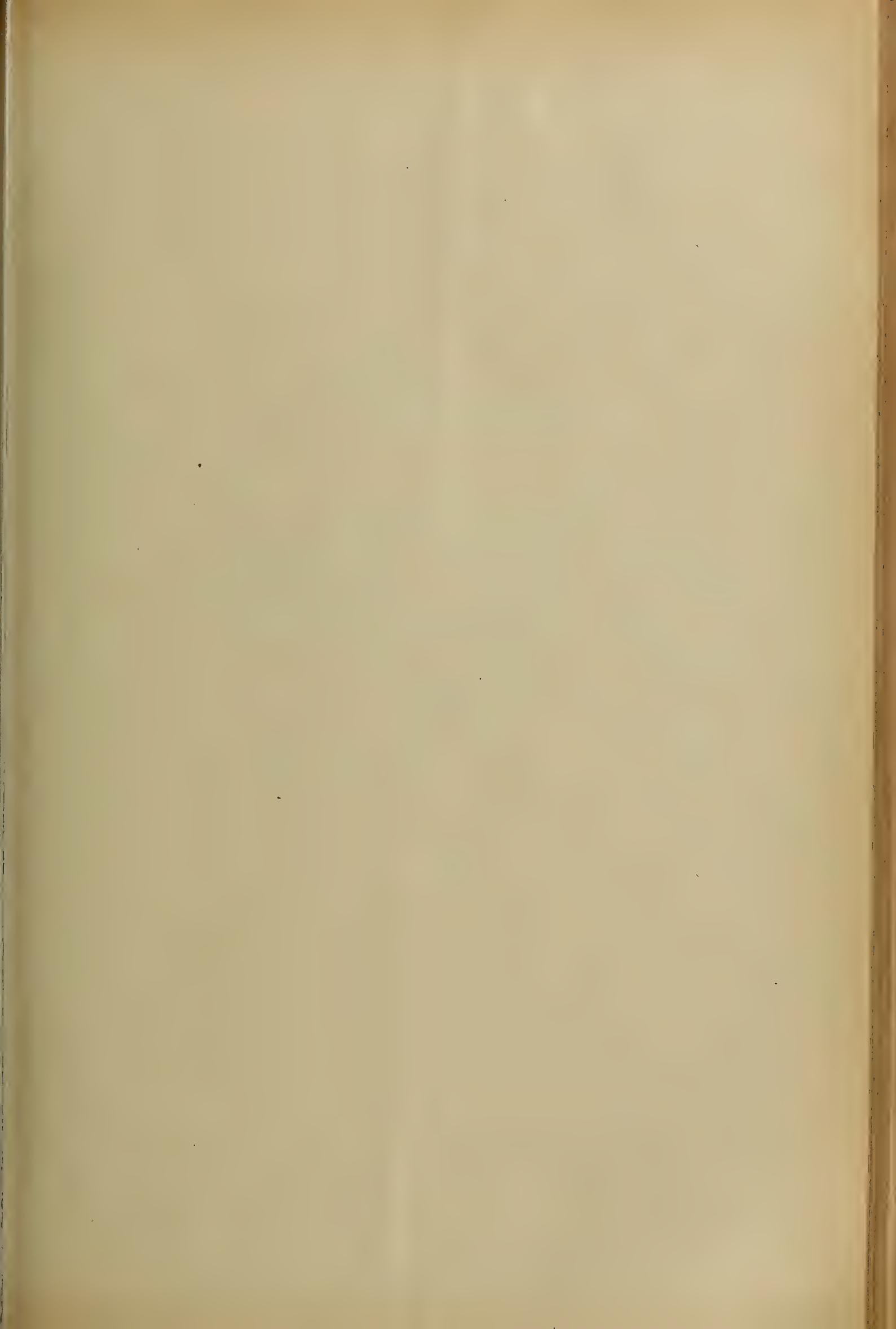
APPLICATION FILED APR. 12, 1904.

3 SHEETS—SHEET 1.



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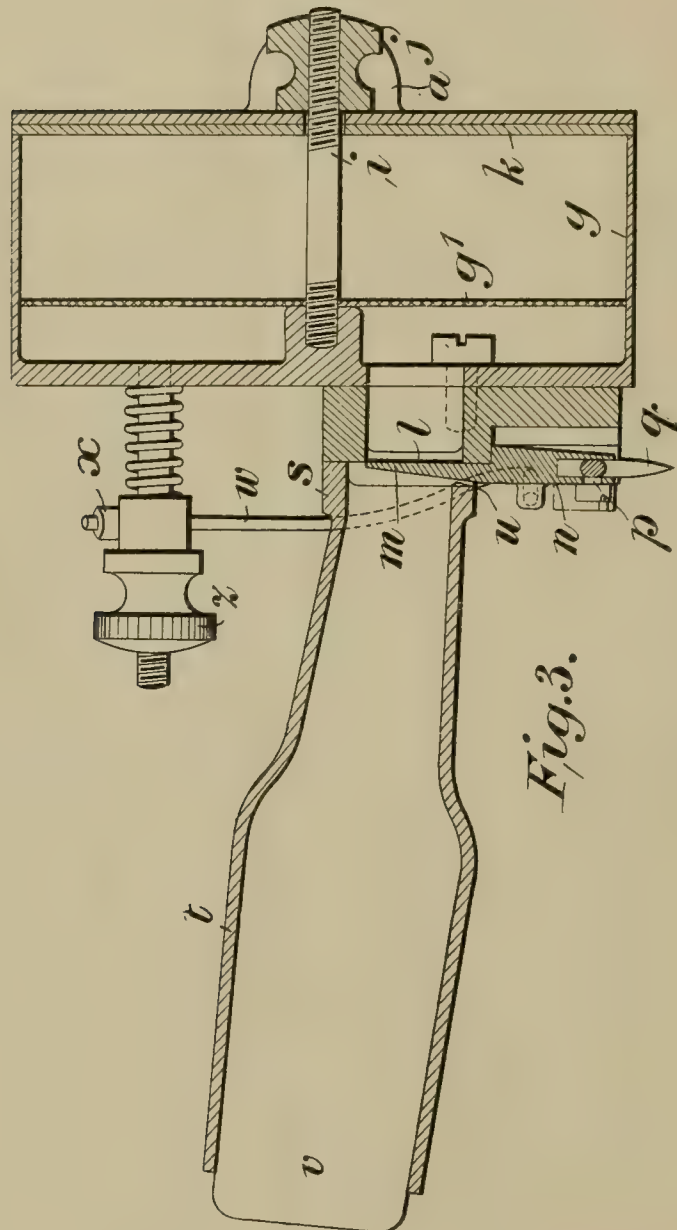
PATENTED APR. 17, 1906.

C. A. PARSONS.

SOUND REPRODUCER OR INTENSIFIER APPLICABLE TO PHONOGRAPHS,
GRAMOPHONES, &c.

APPLICATION FILED APR. 12, 1904.

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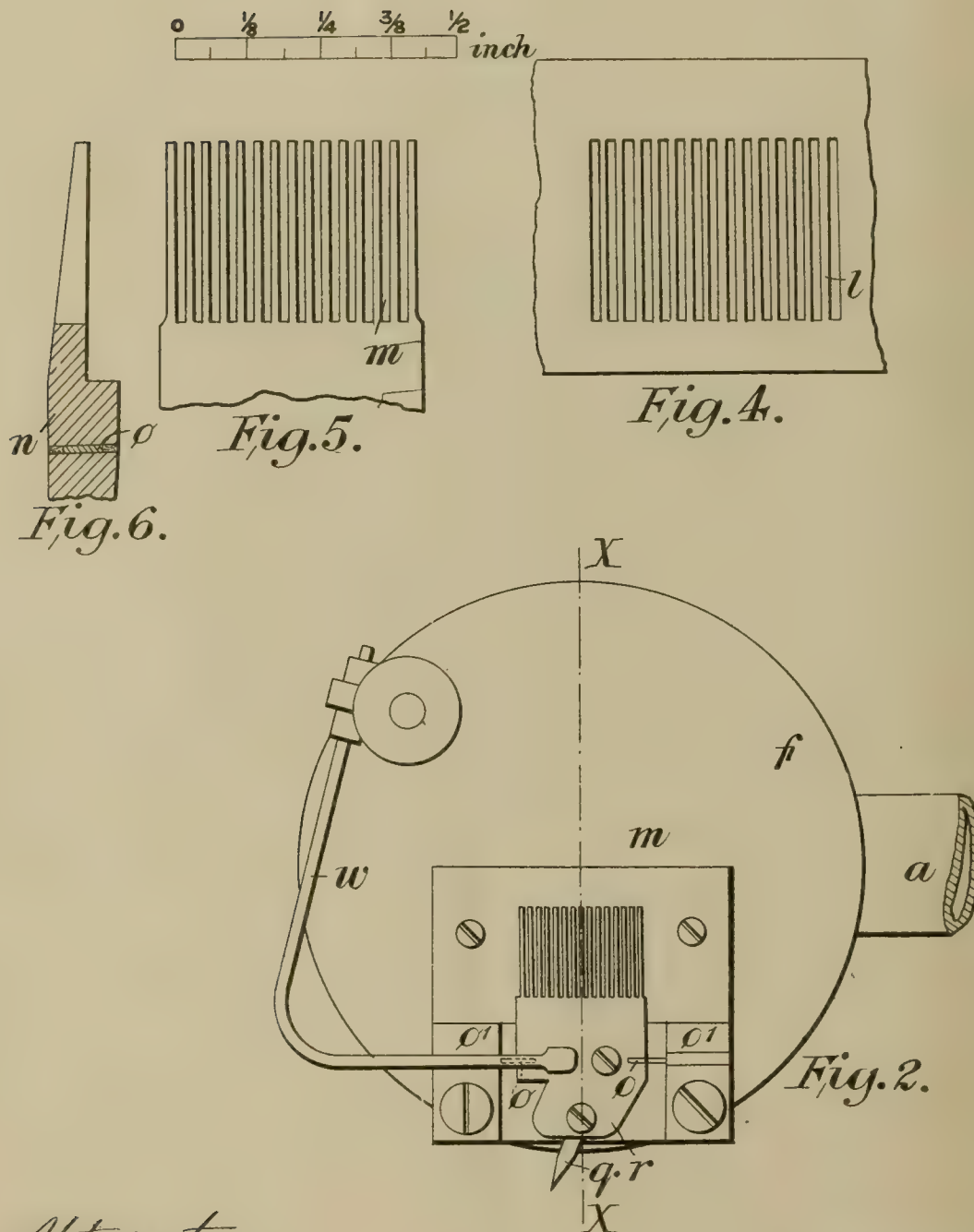
PATENTED APR. 17, 1906.

C. A. PARSONS.

SOUND REPRODUCER OR INTENSIFIER APPLICABLE TO PHONOGRAPHS,
GRAMOPHONES, &c.

APPLICATION FILED APR. 12, 1904.

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UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS, OF NEWCASTLE-UPON-TYNE, ENGLAND.

SOUND REPRODUCER OR INTENSIFIER APPLICABLE TO PHONOGRAPHS, GRAMOPHONES, &c.

No. 817,868.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed April 12, 1904. Serial No. 202,866.

To all whom it may concern:

Be it known that I, CHARLES ALGERNON PARSONS, a subject of the King of Great Britain and Ireland, residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in Sound Reproducers or Intensifiers Applicable to Phonographs, Gramophones, Telephones, and the Like, (for which I have made application for Letters Patent in Great Britain, No. 10,468, bearing date August 5, 1903,) of which the following is a specification.

I am aware that mechanically or automatically operated valves with air or steam—such, for example, as sirens—have been proposed and are in use for the production of sound. I am also aware that Edison proposed the use of an air relay and valve moved by a diaphragm operated by sound, the air from the valve operating a second diaphragm, and this in turn operating a microphone for the purpose of intensifying sound. Also several persons since that date have proposed and described air-relays and similar apparatus for the purpose of intensifying sound, such relays being operated either by a diaphragm moved by the sound-waves or by phonograph or gramophone records.

The present invention relates to the construction and proportioning of such valves or sound reproducers and intensifiers, so as to render them successful and efficient.

Referring to the accompanying drawings, Figure 1 is a front elevation showing the general arrangement of my improvements as applied to a gramophone. Fig. 2 is an enlarged elevation of the compressed-air chamber and its connections, the pipe leading to the trumpet being removed, while Fig. 3 is a section on the line X X, Fig. 2. Fig. 4 is an enlarged elevation of the stationary part of the valve, while Figs. 5 and 6 are respectively an enlarged elevation and sectional end view of the valve-cover. Fig. 7 is a plan view showing means for connecting the trumpet to the reproducer.

Referring to Figs. 1, 2, and 3, *a* is a hollow arm carrying the reproducer at one end and a counterbalance-weight *b* at the other. The arm *a* is carried by a flat spring *c* in one piece with a post *d*, which can rotate in a socket *e* on a fixed part of the gramophone. The compressed-air chamber *f*, supplied with

compressed air from any convenient source through the hollow arm *a*, consists of a cylindrical casing *g*, forming the front of the chamber and clamped to the plate *h*, carried by the arm *a*, by the bolt *i* and thumb-screw *j*, a layer of soft material *k* being clamped between the edge of casing *g* and plate *h*. The chamber *f* is divided by a circular piece of wire-gauze *g'*, the part of the chamber on the air-supply side of the gauze being filled with cotton, wool, or other suitable material and acting as an air-filter. In the front face of the chamber *f* is fixed a grating *l*, forming the stationary part of the valve (more fully described below) and also forming part of the boundary of the compressed-air chamber *f*. A grating *m* forms the valve-cover and is attached to a small steel weigh-bar *n*, which may be mounted, as shown in Figs. 2 and 3, on two very short but flexible flat springs *o o*, parallel to its axis, fixed to supports *o' o'* on the face of the chamber *f* and allowing the weigh-bar *n* to oscillate rotationally only about its axis. In one piece with the weigh-bar, and thus in rigid connection with the valve-cover *m*, is the actuating-arm *p*, which in the gramophone forms a socket for the reproducing-style *q*, held in the said socket by a set-screw *r* or other convenient means. The rectangular base *s* of the conical pipe *t*, leading to the trumpet, is removably seated on the face of the compressed-air chamber *f* and closely surrounds the valve-grating *l*. In one side of the base *s* is a rectangular opening *u* to allow the pipe *t* to be placed in position over the valve-cover *m*. The base *s* of the pipe *t* should give just sufficient clearance to allow the oscillations of the valve-cover *m*, so that as little air as possible passes into the pipe *t*, and so to the trumpet, except through the slots of the valve-cover *m*, and as little air as possible escapes around the valve-cover through the openings *u*. A central diaphragm *v*, parallel to the tongues of the grating *m*, divides the conical pipe *t*. To the weigh-bar *n* is rigidly attached a steel spring-wire *w*, lying in the direction of the axis of the weigh-bar near its point of attachment and bent so that its other end, fitted with a rubber sleeve *x*, bears against an adjustable thumb-screw *z*. The spring-wire *w* always tends to move the valve-cover *m* toward the stationary grating *l*, and by turning the screw *z* the position of the valve-cover *m* when at rest can be adjusted.

Referring to Figs. 4, 5, and 6, the fine gratings *l* and *m*, forming the valve, are of the

same pitch. The slots in the grating *l* may be of rather greater breadth than the tongues of the grating *m*. When the gratings are placed together with the tongues of *m* above the slots of *l*, very little air can pass through them; but when slightly separated in a direction almost normal to their faces by the rotation of *m* about the axis of the weigh-bar *n* air passes through the openings formed at both edges of each tongue. The tongues of the valve-cover are formed wedge-shaped in order to reduce the mass of the moving part of the valve as much as possible consistently with preserving rigidity. The valve I have shown enlarged four times in Figs. 4, 5, and 6 is of dimensions which have been found to work well as applied to a gramophone. Such a valve may be of larger dimensions and of coarser pitch—say thirty-three to the inch—than a valve of the same class suitable for a phonograph. In this class of valve when used for a phonograph I have found by experiment that up to a fineness of pitch of sixty-six per inch and a width of slot of about .008 of an inch there is a steady increase of loudness and clearness of the sound produced. Such a valve for phonograph-records may have twenty slots and twenty-one tongues, each slot three-sixteenths of an inch long, thus giving a total length of lip-opening of two by twenty by three-sixteenths equals seven and one-half inches. Such a valve is very small in dimensions. The thickness of the tongue may be .015 of an inch at the roots, tapering to .003 of an inch at the tips, and the back may stand out from the weigh-bar one-sixteenth of an inch. When made of nine-carat gold, (the metal I sometimes prefer in order to obviate oxidation,) its weight will be about one and one-fourth grains. If made of aluminium, which produces louder sounds, the weight may be reduced to three-fourths of a grain. The amplitude of oscillation of the center of the valve-grating for the gramophone may be about equal to that of the style-point. For the phonograph and ordinary wax records it may be from equal to double that of the style-knob. These ratios depend chiefly on the dimensions and fineness and weight of the gratings. The air-pressure may be from two to five pounds per square inch or even higher; but with three pounds the reproduction from the wax record is louder than the original voice speaking into an Edison Bell recording-phonograph when making the record. Though I have mentioned a fineness of grating of sixty-six-to-the-inch pitch, I have not as yet observed any marked limitation with fineness up to this degree. The gratings do not become stuck or choked, provided an air-filter of cotton or toweling is placed in the supply-pipe. The cutting of such gratings is easily accomplished by fine watch-making tools, including a lathe and thin and fine saws of a thick-

ness equal to the slots to be cut. Such gratings may be formed of two perforated plates or membranes instead of gridirons. Though I have described and illustrated this valve as a single comb, I may form it as a double or a circular or a segmental or other form of comb, the general guiding principle being that it is desirable to reduce the lengths of the tongues to secure their rigidity with a minimum aggregate weight of tongue, and it is therefore desirable to increase the number of tongues as much as possible and to reduce their length and thickness, the limiting thickness of any tongue of given length being determined by this that the frequency of oscillation of the tongue shall be above some given and very high note. If the tongues are too thin, they may set up an audible vibration of their own independently of the controlled oscillation of the valve as a whole. Though I have described the moving member as attached to a weigh-bar actuated by an arm, I may prefer to apply the moving force directly to any part of the valve and to place the fulcrum outside such force relatively to the valve. This disposition I prefer in the case of a circular comb; but in all cases suitable arrangements must be provided to maintain constant proportional displacement of all parts of the valve relatively to the fixed valve-face during oscillation. Although I have described the valve as worked by compressed air and in conjunction with a pressure-chamber, the reproducer may be worked by rarefied air and a suction-chamber. In all cases the moving part of the valve should be placed on the side of less pressure. If placed on the side of greater pressure, it is liable to be in unstable equilibrium and to sound like a reed as a whole on its own account, or the individual tongues of the valve may similarly vibrate.

For use with gramophone-records the volume of the compressed-air chamber must usually exceed one cubic inch and is generally made equal to about three cubic inches. I also slightly throttle the inlet to the compressed-air chamber to increase the steadiness.

In combination with the valve described in this specification I have found by experiment that if the trumpet is lined with velvet, felt, or similar substance for a short distance from the small end sounds of very short wave length, such as scratching and very high harmonics, are much reduced. Also I have found that a piece of tubing with one or more sharp bends introduced between the reproducer and the trumpet is of great assistance in reducing such sounds. The very short waves proceed in radial directions from the valve and impinge on the sides, especially at the bends, and are thereby reduced, while the waves of moderate length travel easily round the bends and are less af-

fect. A convenient method of carrying this into effect is to attach a piece of metal tubing *u* bent twice at right angles to the tube *t*, Fig. 3, and to the trumpet by means of short pieces of rubber tubing, as illustrated in Fig. 7.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for reproducing sounds, comprising in combination, a valve-face; short flexible springs fixed at one side of said valve-face; an oscillating valve-cover mounted on said springs and adapted to control a current of elastic fluid; and means for actuating said valve-cover in accordance with the sounds to be reproduced; substantially as described.

2. An apparatus for reproducing sound, comprising in combination, a valve-face; short flexible springs fixed at one side of said valve-face; an oscillating valve-cover mounted on said springs and adapted to control a current of elastic fluid; means for adjusting the position of said valve-cover relatively to said valve-face; and means for actuating said movable grating in accordance with the sounds to be reproduced; substantially as described.

3. In a sound-reproducing apparatus, in combination; an elastic-fluid chamber; a fixed grating forming part of the boundary of said chamber; a connection adapted for supplying compressed or rarefied elastic fluid to said chamber; short flexible springs fixed to said chamber; an oscillating grating mounted on said springs and adapted to control the flow of elastic fluid through the openings in said fixed grating; and means for actuating said oscillating grating in accordance with the sounds to be reproduced, substantially as described.

4. In a sound-reproducing apparatus, in combination; an elastic-fluid chamber; a fixed grating forming part of the boundary of said chamber; an axially-oscillating bar mounted on said chamber; a grating fixed to said bar and adapted to control the flow of elastic fluid through said fixed grating; means for adjusting the position of said oscillating grating relatively to said fixed grating, and means for actuating said bar in accordance with the sounds to be reproduced, substantially as described.

5. In a sound-reproducing apparatus, in combination; an elastic-fluid chamber; a hollow arm carrying said chamber, a fixed grating forming part of the boundary of said chamber; said hollow arm being movably supported, a connection to said hollow arm adapted for supplying compressed or rarefied

elastic fluid to said chamber; a movable grating adapted to control the flow of elastic fluid through the openings in said fixed grating; and means for actuating said movable grating in accordance with the sounds to be reproduced, substantially as described.

6. In a sound-reproducing apparatus, in combination; an elastic-fluid chamber; a fixed grating forming part of the boundary of said chamber; an axially-oscillating bar mounted on said chamber; a grating fixed to said bar and adapted to control the flow of elastic fluid through said fixed grating; a style-socket-forming arm fixed to said bar; and means for fixing a gramophone or phonograph style in said socket; substantially as described.

7. In a sound-reproducing instrument in combination; a compressed-air chamber; wire-gauze dividing said chamber into two parts; an air-filter on one side of said wire-gauze; a fixed grating forming part of the boundary of said air-chamber; a grating movable in a substantially normal direction so disposed as to cover the openings in said fixed grating; and means for actuating said movable grating in accordance with the sounds to be reproduced; as set forth.

8. In a sound-reproducing apparatus, in combination; an elastic-fluid chamber; a fixed grating forming part of the boundary of said chamber; an axially-oscillating bar mounted on said chamber; a grating fixed to said bar and adapted to control the flow of elastic fluid through said fixed grating; a style-socket-forming arm fixed to said bar; a style fixed in said arm; and means for actuating said style in accordance with the sounds to be reproduced; substantially as described.

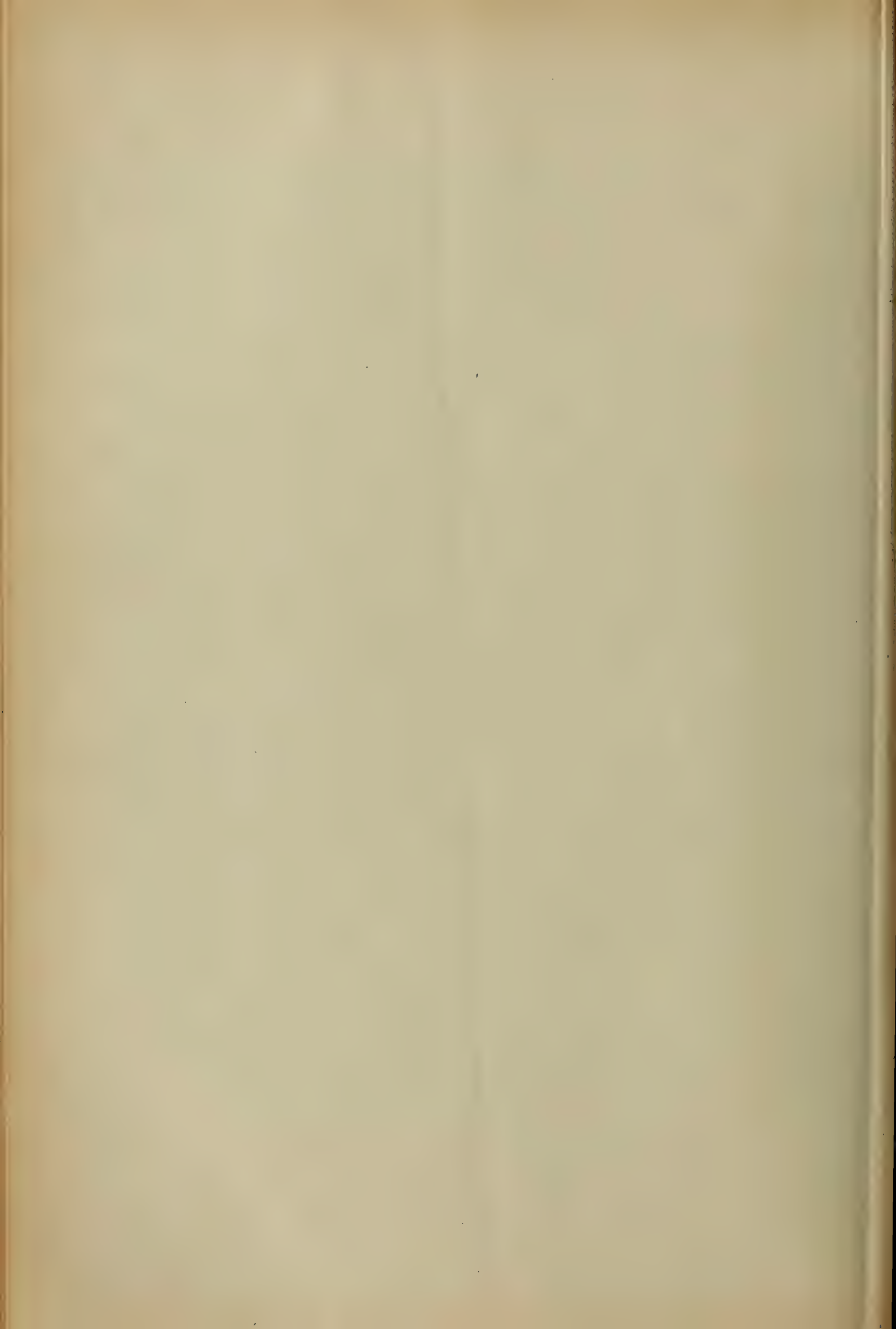
9. In a sound-reproducing instrument in combination; an elastic-fluid chamber; a connection adapted for supplying elastic fluid to said chamber; a fixed grating forming part of the boundary of said chamber; a grating movable in a substantially normal direction adapted to control the flow of elastic fluid through said fixed grating; a tube fixed to said chamber leading from said grating; a short connecting-tube having two or more sharp bends between said tube and the trumpet; and means for actuating said movable grating in accordance with the sounds to be reproduced, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES ALGERNON PARSONS.

Witnesses:

HERVEY GRAHAM DAKYNS, Jnr.,
WILLIAM DAGGETT.

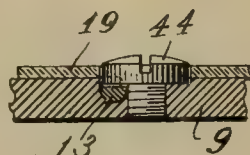
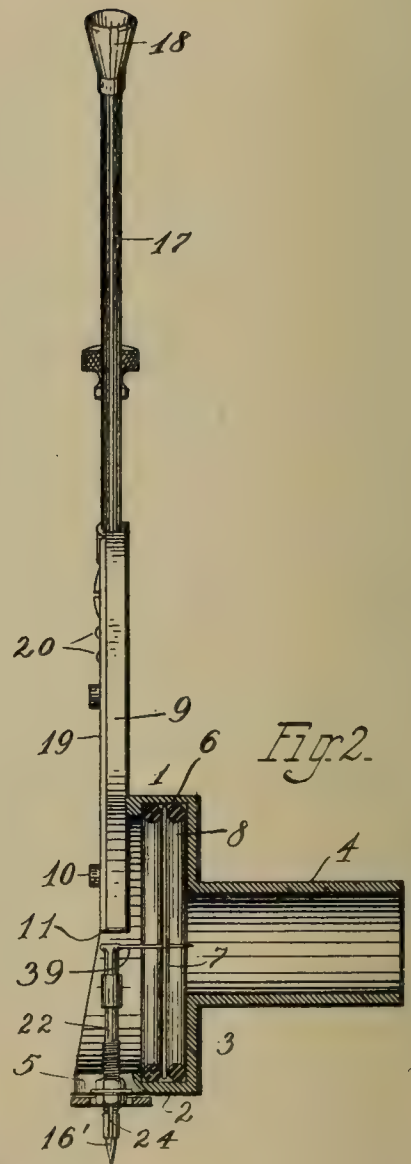
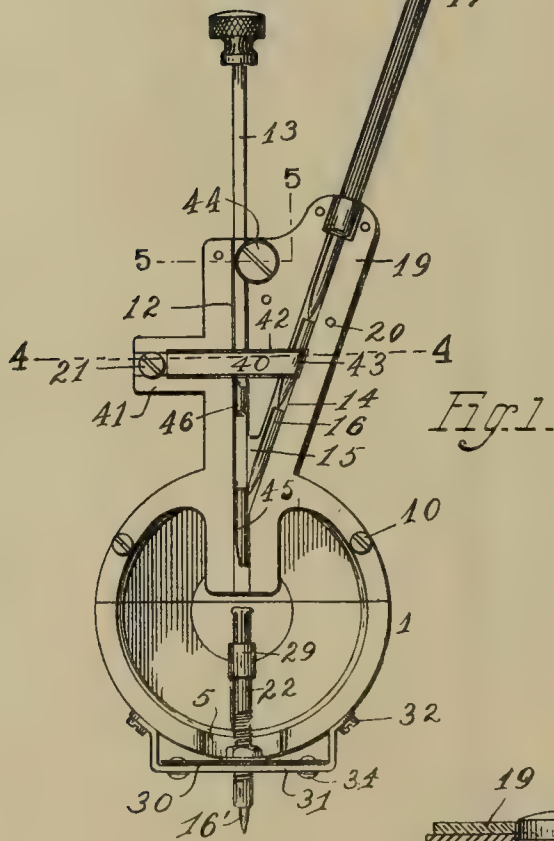
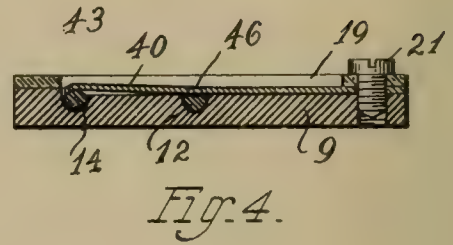
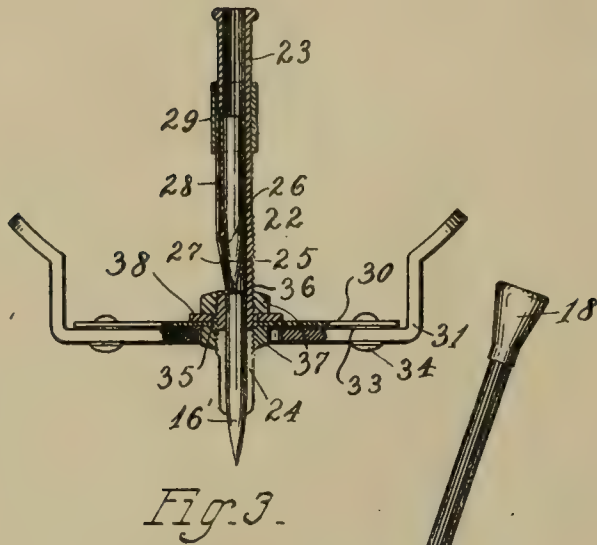


No. 818,119.

PATENTED APR. 17, 1906.

C. A. G. PRITCHARD.
SOUND BOX.

APPLICATION FILED SEPT. 2, 1905.



Witnesses:
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B. W. Brockitt.

Inventor,
Charles A. G. Pritchard.
By Founts & Hull.
Attys.

UNITED STATES PATENT OFFICE.

CHARLES A. G. PRITCHARD, OF CLEVELAND, OHIO.

SOUND-BOX.

No. 818,119.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed September 2, 1905. Serial No. 276,894.

To all whom it may concern:

Be it known that I, CHARLES A. G. PRITCHARD, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Sound-Boxes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to sound-boxes, and has for its object to provide in a simple and inexpensive construction means for storing and feeding styluses to the stylus tube or retainer, also means for securely retaining the stylus in place during the operation of the machine, also an improved form of resilient support for the stylus tube or retainer.

Generally speaking the invention may be defined as consisting of the combinations of parts illustrated in the drawings, described in the specification, and embodied in the claims hereto annexed.

In the drawings, Figure 1 represents a front elevation of a sound-box constructed in accordance with my invention. Fig. 2 represents a side elevation, partially in section, of the device shown in Fig. 1. Fig. 3 represents an enlarged sectional detail showing the construction of the stylus tube or retainer and of the support therefor. Fig. 4 represents an enlarged sectional view on the line 4 4 of Fig. 1, and Fig. 5 represents an enlarged sectional view on the line 5 5 of Fig. 1.

Describing the parts by reference-numerals, 1 represents the body of the box, said body being circular in outline and having a cylindrical side wall 2 and a head 3, carrying the usual connection 4 for the horn or megaphone. As will appear more particularly from Fig. 2, the lower portion of the box projects forwardly and is provided in the lower portion thereof with a slot or opening 5 for the reception of the stylus tube or retainer. Adjacent the head 3 the side wall is provided with a groove 6 for the reception of the mica disk 7 and the retaining rings or washers 8, which may be of rubber or any suitable material.

The upper forward end of the body is cut away for the reception of a plate or member 9, which plate or member may be removably secured to the box-body by means of screws 10. A pair of ledges or shoulders 11 are provided at the junction of the lower inclined portion with the upper portion, said ledges or shoulders receiving the lower end of said

plate or member 9. This plate or member 9 is scored to provide a vertically-arranged groove or channel 12 for the reception of a plunger 13 and a groove or channel 14, said latter groove or channel being inclined with respect to the former and branching therefrom at a point below the lower end thereof. The metal between said channels is cut away at 15 to permit the stylus 16 to be delivered into the channel 12 when the plunger 13 is elevated sufficiently.

17 denotes a feed or supply tube for styluses, said tube being of any desired length and having at its upper end a funnel-shaped inlet 18 and being detachably connected to the upper end of the plate or member 9 in alinement with the groove or channel 14 therein. The chambers 12 and 14 are closed or completed by means of the transparent plate 19, said plate being secured to the member 9, as by pins or rivets 20 and the screws 10 and 21.

22 designates the stylus-retainer. This retainer consists of a tubular member 23 in alinement with the channel 12. The lower end of the member 23 is contracted to embrace the lowered tapered portion of the stylus 16' and is provided with oppositely-located slots 24, extending through the lower end thereof. The metal being resilient, a friction-clamp is thus provided, which portion prevents the stylus from dropping out of the lower end of the tube 23. As the friction necessary to retain the stylus against upward displacement would necessarily be great and would interfere with the easy removability of the stylus from the tube when desired, I provide a chuck for the upper end or head of the stylus, as follows: At the proper distance from the lower end of the tube a perforation 25 is provided, the upper wall of said perforation being beveled at 26 to receive the inwardly-bent lower end 27 of a flat spring 28. This spring is conveniently retained in place by means of a sliding collar 29, surrounding the tube 23. The surface of the tube is cut away or flattened to receive said spring and to allow the outer surface thereof to be substantially flush with the surface of said tube, thereby permitting the sleeve to be adjusted to permit removal of the spring and to vary the resistance thereof to the passage of the stylus and above the one in the clamp. The lower end of the spring projects within the bore of the tube a suffi-

cient distance to engage the upper end of the head of the stylus 16' and prevent upward displacement thereof.

In order to provide a resilient support for the stylus tube or retainer, I employ a flat spring 30, the end portions of which are suitably secured to a bridge 31, carried by the lower end of the box-body, said bridge being secured to the box-body, as by screws 32. This spring is spaced from the bridge 31, as by metallic washers 33, through which and the bridge and spring extend the rivets 34. The central portion of said spring is provided with an opening 35 for the reception of the tube 23, the portion 36, which extends through said opening, being provided with a screw-thread. By means of nuts 37 and a washer 38 said tube is readily and adjustably secured to said spring. The bridge provides a firm support for the spring at the time when the plunger 13 is being operated to eject a stylus therefrom, while the slight spacing of said spring from the bridge enables it to vibrate with the stylus-tube and transmit such vibrations through the connection 39 to the disk 7.

It will be observed that the tube 17 and a portion of the channel 14 therebelow provide a magazine for the storage of styluses end to end. In order to retain such styluses in the magazine until such time as it may be desirable to supply them to the tube or retainer 22, I employ a detent consisting of a flat spring 40. This spring is conveniently secured in place by inserting an end thereof beneath the part of the transparent plate 19, which covers the arm or bracket 41, projecting from the plate 9. This end of the spring is conveniently secured by the screw 21. A slot 42 is provided in the plate 19, extending from a point near the screw 21 across the channels 12 and 14. The spring 40 lies within this slot and fits more or less closely against the plate 9, said plate being recessed, as shown in Fig. 4, to retain the spring against lateral movement. The free end of the spring is bent inwardly at 43 to engage the lowermost stylus in the magazine and hold it and the stylus thereabove from being supplied to the portion of the channel 14 below said spring.

The plunger 13, to which reference has been made hereinbefore, is flattened throughout the major portion of its length, as will appear from Figs. 1 and 4, thereby enabling it to be slid freely beneath the spring 40. The lower end 45 of the plunger is circular in section to permit it to engage the inner wall of the stylus tube or retainer 22. A suitable distance above the portion 45 it is provided with a cam or projection 46 to engage with the lowermost stylus of the magazine. The lower end of this projection or cam 46 is beveled, as appears in Fig. 1, and the upper end is downwardly inclined to correspond nearly

to the contour of the screw 44, which serves as a stop to prevent the withdrawal of the plunger; the portion of the plunger in such case being indicated by dotted lines in Fig. 1.

The screw 44 has a wide head flattened on its under surface to engage the flattened surface of the plunger and prevent it from being turned out of operative relation to the spring 40, the plate 9 being countersunk to permit adjustment of said screw.

With the parts in the position shown in full lines in Fig. 1 it will be apparent that by elevating the plunger to the position shown in dotted lines the stylus 16 in the lower part of the chamber 14 will be free to fall into the lower part of the channel 12. Before the end 45 of the plunger clears the lower end of the said stylus the projection 46 will have passed above the spring 40 and said spring will have returned to place in engagement with its stylus, thereby permitting only the stylus 16 to pass into the lower portion of the channel 12 and thence into the tube 23. On its return movement the end of the plunger 45 sufficiently covers the lower end of the channel 14 before the engagement of the spring 40 by the projection 46 to prevent the stylus released by elevating the spring from passing into the channel 12. It will thus be seen that in normal operation the styluses will be fed one at a time into the stylus-tube 23 by the movement of the plunger. As the lower end of the tube 23 may offer considerable resistance to the discharge of styluses there-through, the provision of the bridge 3 is an important feature as limiting the bending of the spring 30 and preventing injury to the disk 7 or the connection between the same and the tube.

Aside from its adaptability to eject styluses from the stylus tube or retainer the insertion of the plunger into said tube serves to lessen the amplitude of vibration of the said tube and to correspondingly muffle or diminish the volume of sound emitted from the box, the amount of such reduction being proportionate to the distance the plunger is inserted within said tube. As it is difficult to assemble the parts so that the stylus-tube and plunger-groove channels are in exact alinement, it is not necessary to make the lower end of the plunger of exactly the same size as the bore of the tube, since with the parts slidably out of alinement a portion of the lower end of such plunger will engage a portion of the inner wall of the tube to decrease the vibration thereof.

While I have described the invention in detail, it will be obvious that such details may be modified or departed from more or less without avoiding the spirit of my invention, and I do not propose to be limited to such details except as they may be positively included in the claims hereto annexed or rendered necessary by the prior state of the art.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sound-box having in combination a stylus tube or retainer, a channel in alinement therewith, and a second channel for styluses communicating with the first-mentioned channel at a point above the upper end of the tube or retainer, said second channel being inclined with respect to the first, and a plunger in said first-mentioned channel having a range of movement permitting its lower end to be withdrawn to uncover the junction of said channels and to be inserted into the tube or retainer to eject styluses therefrom, substantially as specified.

2. A sound-box having in combination a retainer for styluses, a channel in alinement with said retainer, a plunger in said channel, a second channel, communicating with the first channel, wherein styluses may be stored, a spring extending across said first-mentioned channel and having a portion projecting into the second channel, and a plunger in said first-mentioned channel having means thereon adapted to engage said spring, substantially as specified.

3. A sound-box having in combination a stylus-retainer, a channel in alinement therewith, a magazine wherein styluses may be stored end to end and communicating with said channel, means for retaining the styluses in said magazine, and a plunger in the channel adapted to operate such retaining means to cause the release of styluses therefrom, substantially as specified.

4. A sound-box having in combination a stylus tube or retainer provided with means for normally retaining a stylus therein, a channel in alinement therewith, a magazine for styluses, a channel connecting said magazine and first-mentioned channel, means for retaining styluses in said magazine, and a plunger in said first-mentioned channel constructed and adapted when in lowered position to eject a stylus from the tube or retainer, in elevated position to permit a stylus to pass from the connecting-channel into the first-mentioned channel, and in intermediate positions to operate the retaining means to release styluses therefrom to cut off communication between the channels, substantially as specified.

5. In a sound-box the combination of a stylus-retainer, a magazine for supplying styluses thereto, a spring-detent arranged to prevent the feed of styluses from the magazine to the retainer, and a plunger adapted to engage said detent and move it in a direction to permit the feed of styluses from the magazine, substantially as specified.

6. In a sound-box, the combination of a stylus-retainer, a magazine for supplying styluses thereto, a spring-detent arranged to en-

gage the stylus in the magazine nearest the retainer, and a plunger adapted to engage said detent and move it in a direction to release said stylus, substantially as specified.

7. In a sound-box, the combination with a stylus-retainer, of a stylus-magazine in which styluses may be stored end to end, and means for feeding the styluses successively from said magazine into said retainer, substantially as specified.

8. In a sound-box, the combination with a stylus-retainer, of a plunger located in line therewith, and a stylus-magazine wherein styluses may be stored end to end, branching from said retainer, the plunger serving to feed the styluses successively from the magazine into said retainer, substantially as specified.

9. In a sound-box, the combination with a needle or stylus-retainer, of a stylus-magazine in which styluses may be stored end to end, a spring-detent controlling the advance of the styluses, and means for successively releasing said styluses from the detent and feeding them into said retainer, substantially as specified.

10. The combination of a sound-box having a stylus-retainer, a channel communicating therewith, a magazine wherein styluses may be placed end to end adapted to communicate with said channel, and means for permitting or cutting off the supply of styluses from said channel to said retainer, substantially as specified.

11. A sound-box having at its lower portion a stylus tube or retainer and at its upper portion a magazine wherein styluses may be stored end to end detachably secured to the upper portion of the box-body, substantially as specified.

12. A sound-box having in combination a stylus-retainer, a channel for styluses communicating therewith, and a tube adapted to communicate with such channel and removably secured to said box, the upper end of said tube being provided with a funnel-shaped inlet, substantially as specified.

13. A sound-box having in combination a bridge or support having an opening there-through, a flat spring secured to said bridge on opposite sides of said opening and spaced therefrom, said spring having an opening in alinement with the opening in the bridge, a stylus-tube having a threaded portion in the opening of the spring, and a nut on such threaded portion of said tube on each side of said spring, substantially as specified.

14. In a sound-box, the combination of a cylindrical body having its lower portion projecting beyond the plane of the upper portion and provided with an opening therethrough, a bridge carried by such lower portion of the body and having an opening therethrough, a spring carried by said bridge, and a stylus tube or retainer connected to said spring and

extending through the openings in the bridge and the lower portion of the body, substantially as specified.

15. In a sound-box the combination of a
5 needle-magazine, a needle-tube to receive the needles from the magazine, a clamp at the lower end of said tube, a plunger for forcing the needles from and into said clamp, a bridge attached to the body of the sound-box and
10 provided with an opening therethrough, a plate-spring secured to the upper side of said bridge and having the needle-tube passing through the middle thereof and through the opening in the bridge, a nut on said tube be-
15 low the spring and a washer and nut on said tube above the spring whereby the tube is adjustably secured to the spring, the bridge serving as a firm support for the spring and needle-tube when the plunger is forcing needles from and into the chuck, substantially as specified.

16. A stylus tube or retainer for sound-boxes having at its lower end means for preventing a stylus from dropping or falling out
25 and a spring adapted to engage the upper end of such stylus to prevent it from moving upwardly in said tube or retainer, substantially as specified.

17. A stylus-tube for sound-boxes having
30 an opening in the wall thereof, a spring secured to said tube and having an inwardly-projecting portion normally extending into said opening, said opening being positioned to permit the engagement of a stylus by such
35 inwardly-projecting portion of the spring to prevent the stylus from moving upwardly in said tube, substantially as specified.

18. A stylus-tube for sound-boxes having an opening in the wall thereof, a flat spring
40 secured to the outside of the tube and having a free end intumed to project through said opening, the opening being located to permit such end of the spring to engage the upper end of a stylus, substantially as specified.

19. A stylus-tube having its lower portion provided with retaining means for preventing a stylus from dropping or falling out and having an opening in its wall above such lower portion, a flat spring having an in-
50 turned end adapted to project through said tube to engage the upper end of a stylus, and an adjustable sleeve surrounding said tube and spring, substantially as specified.

20. In a sound-box, the combination of the
55 box-body, said body being provided with a member having a score therein for the supply of styluses, a transparent plate covering said score and providing therewith a channel, and a stylus tube or retainer carried by said
60 body, substantially as specified.

21. In a sound-box, the combination of the box-body, said body being provided with a member having therein a plunger groove or channel and a stylus-supplying groove or
65 channel, a transparent plate covering said

grooves or channels, and a stylus tube or retainer in alinement with said plunger groove or channel, substantially as specified.

22. In a sound-box, the combination of the box-body, said body being provided with a
70 member having therein a plunger groove or channel and a stylus-supplying groove or channel, a plunger in the latter groove or channel, a stylus-retainer carried by said body, a flat spring extending across said
75 grooves or channels and having a portion projecting into the stylus groove or channel to retain styluses therein, said plunger having an elevated portion adapted to engage said
80 spring and operate it to move the projecting portion thereof out of the path of the styluses in the stylus-supplying groove or channel, substantially as specified.

23. In a sound-box, the combination of a plate provided with a plunger-groove, a
85 cover for said groove, a needle tube or retainer supported with its upper end in line with the plunger-groove and having a clamp at its lower end, a tubular needle-receptacle removably attached to the said plate, and a
90 plunger for forcing the needles from and into said clamp, substantially as specified.

24. In a sound-box, the combination of a plate provided with a plunger-groove and with a needle-groove branching from the
95 plunger-groove, a needle tube or retainer supported with its upper end in line with the plunger-groove and having a clamp at its lower end, and a spring crossing the plunger-groove and serving as a stop for the needles
100 in the needle-groove, a cover-plate for said grooves having a slot for said spring, and a plunger in the plunger-groove for lifting said spring to release a needle in the needle-groove and permit it to slide through the needle-
105 tube to said clamp, substantially as specified.

25. In a sound-box, the combination of a plate provided with a plunger-groove and with a needle-groove branching from the
110 plunger-groove, a needle-tube supported with its upper end in line with the plunger-groove and having a clamp at its lower end, a flat spring attached to the face of said plate and extending across the plunger-groove to the needle-groove and serving as a stop for
115 the needles, a plunger in the plunger-groove provided with a cam for lifting said spring to release a needle from the needle-groove, and a cover-plate for said groove provided with a slot for said spring, said cover-plate being
120 transparent to permit the operator to determine the correct position and operation of the plunger, spring, and needles, substantially as specified.

26. In a sound-box, the combination, with
125 the needle or stylus tube or retainer, of a plunger for entering the same and thereby regulating the volume of sound, substantially as specified.

27. In a sound-box, the combination of a
130

stylus tube or retainer, of a member having therein a score providing part of a plunger groove or channel, a plate covering said score and completing said groove or channel, a magazine adapted to communicate with said groove or channel, means for retaining styluses in said magazine, a plunger in said groove or channel having a flattened surface adjacent said plate and a projection or cam for operating said retaining means, and a screw having its head overlapping said score and the flattened surface of the plunger to serve as a stop for said plunger and prevent the same from turning, substantially as specified.

28. In a sound-box, the combination of a stylus tube or retainer, of a member having therein a plunger groove or channel in alinement with said tube or retainer, a magazine adapted to communicate with said groove or channel, means for retaining styluses in said magazine, a plunger having a flattened surface and a cam projecting therefrom adapted to operate said retaining means, and a screw having its head overlapping such flattened surface of the plunger, said cam having a surface conforming to the contour of the screw-head, substantially as specified.

29. A sound-box having, in combination, a bridge or support having an opening therethrough, a flat spring secured to said bridge on opposite sides of said opening, said spring

having an opening in alinement with the opening in the bridge, a stylus-tube having a threaded portion in the opening of the spring, and a nut on such threaded portion of said tube on each side of said spring, substantially as specified.

30. A sound-box having, in combination, a body having an opening therethrough, a bridge secured to said body and extending across said opening, said bridge having itself an opening in alinement with the opening in the body, a flat spring secured to said bridge and extending across said opening, said spring having an opening therethrough in alinement with the opening in the bridge, a stylus-tube extending through the opening in said spring and having an adjustable connection therewith, substantially as specified.

31. A sound-box having, in combination, a stylus-retainer, a channel for styluses communicating therewith, and a tubular magazine wherein styluses may be stored end to end adapted to communicate with such channel, the upper end of said magazine being provided with a funnel-shaped inlet, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES A. G. PRITCHARD.

Witnesses:

S. E. FOUTS,
B. W. BROCKETT.



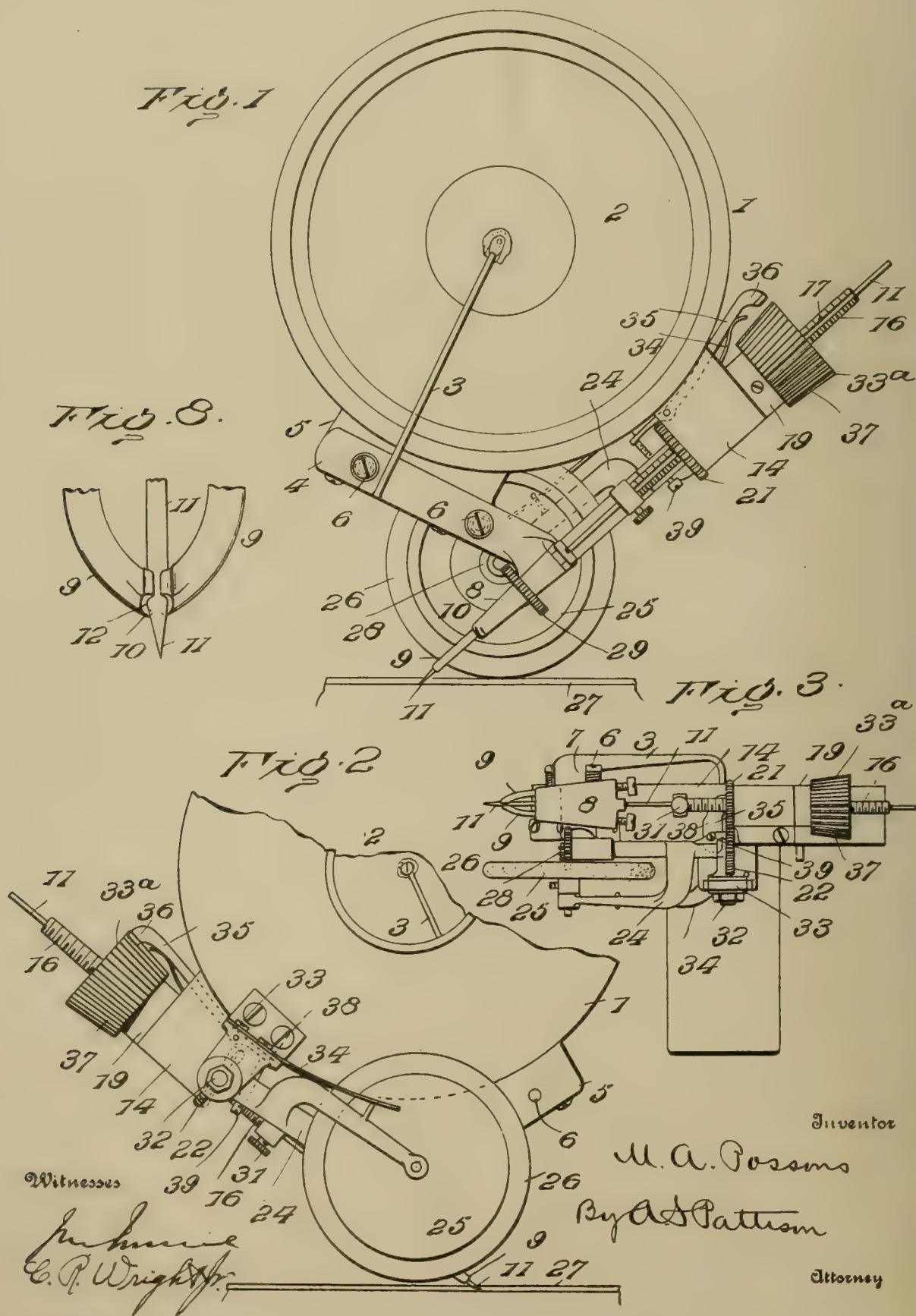
No. 818,975.

PATENTED APR. 24, 1906.

M. A. POSSONS.
TALKING MACHINE.

APPLICATION FILED NOV. 28, 1904. RENEWED SEPT. 7, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 4.

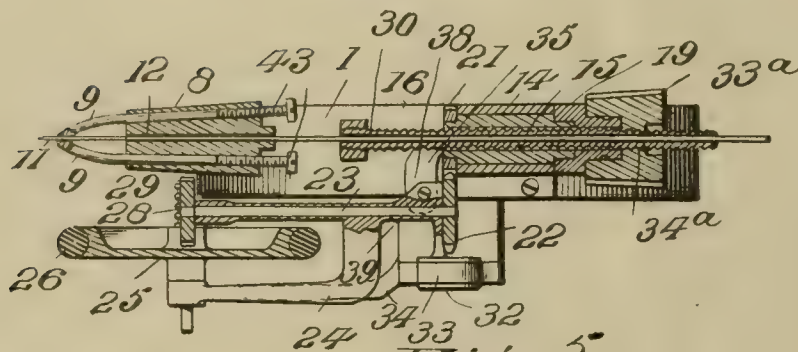


Fig. 5.

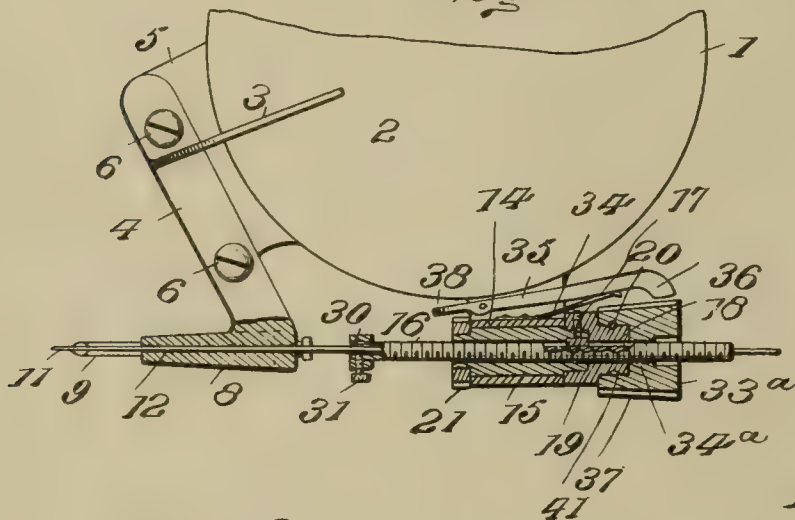


Fig. 6.

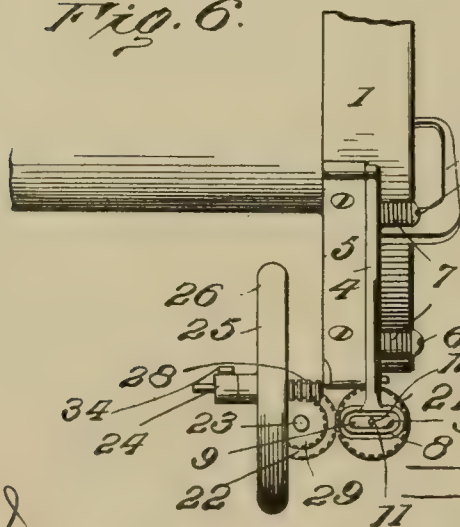
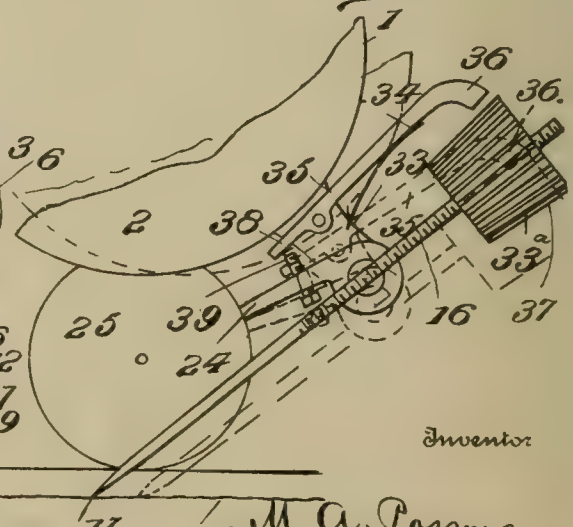


Fig. 7.



Witnesses:

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By

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UNITED STATES PATENT OFFICE.

MINARD A. POSSONS, OF CLEVELAND, OHIO.

TALKING-MACHINE.

No. 818,975.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed November 28, 1904. Renewed September 7, 1905. Serial No. 277,364.

To all whom it may concern:

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in talking-machines and pertains to that class of machines in which a disk record is used and a metal stylus.

One object of my invention is to provide an improved means for rotating the stylus while in contact with the record, whereby the reproducing-point thereof is kept tapered or sharpened and permitting the same stylus or needle to be used continuously until it is too short for further use.

Another object of my present invention is to combine with the rotating feature of the stylus or needle an automatic means for feeding the stylus longitudinally as it is worn away.

My present invention also involves other details of construction which will be particularly pointed out hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of my invention. Fig. 2 is a side elevation looking from the opposite side shown in Fig. 1. Fig. 3 is a top plan view of the mechanism which embodies my invention. Fig. 4 is a longitudinal sectional view taken through the adjustable needle and its cooperating mechanism. Fig. 5 is a sectional view at right angles to Fig. 4. Fig. 6 is an inverted plan view. Fig. 7 is a diagrammatic view showing the operation of the parts. Fig. 8 is an enlarged perspective view of the clamping-jaws for holding the adjustable needle.

My United States Patent, No. 741,543, of October 13, 1903, shows and describes a rotatable needle and a certain form of means for rotating it. My present invention involves a specific means for revolving the needle, involves means for automatically feeding the needle longitudinally, and also certain details of construction, neither of which is shown in my prior patent.

Referring now to my present improvements, 1 indicates a sound-box of the ordinary construction. The diaphragm 2 has the usual connection 3 therewith, the opposite end of the connection 3 being connect-

ed with a member 4, which is supported or rather connected with a bracket 5 through the medium of screws 6 and springs 7. Rigidly connected with the member 4 is a jaw-holding extension 8. This extension 8 carries the adjustable jaws 9, the outer ends 10 of which are suitably shaped to clamp the pointed end of the needle 11, as shown in Fig. 8. Formed in the jaw-holding extension 8 is a longitudinal needle passage-way 12, through which the needle 11 may freely rotate and move longitudinally.

Projecting from the side of the sound-box 1 is a suitable bracket 14, in which is journaled a rotatable sleeve or equivalent member 15, through which passes a needle-carrying member 16. This member 16 is provided with an external longitudinal groove 17, in which a pin or feather 18, carried by the member 15, engages. The said groove 17 extends throughout the length of the needle-carrying member 16 and permits the said member to be moved longitudinally through the rotating member 15, but locks the members 15 and 16 against independent rotation. A cap 19 is secured to the upper end of the rotatable member 15 through the medium of a pin or screw 20, thus locking these parts together and making them practically one element, so far as operation is concerned, after the parts are assembled. The cap being removable, however, it enables the member 15 to be placed in position within the bracket 14 or to be removed therefrom.

Secured to the lower end of the member 15 is a gear 21, and this gear 21 meshes loosely with a gear 22, which is attached to the upper end of a shaft 23. This shaft 23 is journaled in a suitable bracket 24. Journaled to the lower end of the bracket 24 is an actuating-wheel 25, preferably carrying a rubber rim 26 for engagement with the record 27. Concentrically connected with the actuating-wheel 25 is a worm 28, and this worm is in operative engagement with a worm-gear 29, attached to the lower end of the previously-mentioned shaft 23. The needle 11 is connected with the needle-carrying member 16 by passing into a longitudinal opening therein and being held by a thumb clamp-screw 31.

From the foregoing description it will be understood that as the record rotates the wheel 25 in engagement therewith is rotated, and through the medium of the worm 28, gears 29, 21, and 22 the member 15 is ro-

tated and in turn rotates the needle-carrying member 16. The needle being rotated and supported at an inclination the point thereof will always be tapered and will accurately follow the indentations of the record and will at all times make as good a reproduction as a new needle and, in fact, better, because the needle is not dulled by contact with the record, as in a non-rotatable needle.

Thus far I have only described that part of my present invention which pertains to the means for rotating the needle irrespective of whether the needle is adjusted longitudinally, automatically, or otherwise. The primary object of rotating the needle is to avoid the necessity of using a new needle for each record, as is the case with a non-rotatable needle, and to permit the needle to be continuously used until it becomes too short to be held by the clamping member. It therefore follows that to obtain the full advantage of a rotatable needle it must be moved longitudinally as it is worn away. My previously-mentioned patent shows means whereby the operator may adjust the needle. I will now explain that part of my present invention which accomplishes the automatic adjustment or longitudinal movement of the needle as it is worn away.

The automatic feature of my present invention for adjusting the needle longitudinally may be varied in detail of construction without departing from the spirit and scope of my invention, since, so far as I am aware, a rotatable and automatically longitudinally-adjusted needle for talking-machines has not been previously devised. I therefore herein show for the purpose of enabling my invention to be understood one convenient form for accomplishing automatically the adjustment of a rotatable needle. The particular form here shown consists in pivoting the bracket 24, which carries the operating-wheel 25, and the pivotal point here shown is indicated at 32 in a suitable support or bracket 33, which is secured to the sound-box 1, whereby the bracket and wheel are permitted to swing or oscillate upon the said pivotal point. A spring 34 engages the bracket and serves to hold the wheel 25 in contact with the record 27. As is understood by those skilled in this art, the sound-box is supported by the needle, which in turn is in engagement with the record 27. The wheel 25 is therefore yieldingly held in contact with the record 27, so that the sound-box 1 may move downward as the point of the needle wears away. In the form here shown the automatic longitudinal adjustment of the needle is controlled by the movement of the sound-box independent of the wheel and bracket, which are movably supported by the sound-box, the movement of the sound-box being occasioned, as just stated, by the wearing away of the point of the needle.

The downward movement of the sound-box 1 in the form of mechanism herein disclosed effects the automatic longitudinal adjustment of the needle through the following instrumentalities: Loosely swiveled to the upper end of the member 15 is a screw-head or ratchet 33, and the needle-carrying member 16 is externally screw-threaded for the purpose of engaging the internal screw-threads of the opening 34 in said ratchet or screw-head 33. A locking member 35 is provided and is here shown in the form of a pivoted lever, one end 36 of which is adapted to be moved into and out of engagement with the roughened or ratchet-shaped outer surface 37 of the said screw-head 33. The opposite end 38 of the said lever 35 is adapted to be engaged by a projection, screw, or pin 39, but preferably a screw, whereby it is capable of adjustment. Means is provided for normally holding the end 36 of the lever 35 out of engagement with the screw-head 33, and the means here shown consists of a suitable spring 40. The means here illustrated for swiveling the screw-head 33 to the member 19, which is rigidly connected to the member 15, consists in providing the member 19 with a circumferential groove 41 and the screw-head with a pin or projection 42, loosely engaging the said groove. For the purpose of facilitating the description and assisting in the understanding of this automatic feature of my invention the diagrammatic view, Fig. 7, will be referred to. The solid lines of this diagrammatic view show the parts in their normal positions and the automatic adjusting feature out of operation. The dotted lines show the position of the parts when the automatic feature of adjusting the needle longitudinally is in operation. Referring to the position of the parts, as shown in solid lines, the friction between the screw-threaded portions of the head 33 and the needle-carrying member 16 is sufficient to cause the screw-head to rotate with the member 16. The needle being the support for the sound-box, as the point of the needle wears away the sound-box will move downward to the position indicated in dotted lines, and which will carry the screw or projection 21 in contact with the end 38 of the lever 25 and cause the opposite end 36 of the lever to be moved in contact with the roughened or ratchet surface of the screw-head 33 and lock or hold it against rotation. The screw-head being locked against rotation and the needle-carrying member 16 continuing to rotate, the engaging screw-threads of the head 33 and member 16 will cause the member 16 to move longitudinally and force the point of the needle outward between the jaws 9 until the sound-box has been raised sufficiently to prevent the projection 39 from holding the end 36 of the lever 35 in engagement with the screw-head 33. From the foregoing it will

be understood that the needle will be longitudinally adjusted, as may become necessary on account of the wearing away thereof, and without any attention on the part of the operator.

For the purpose of enabling a long needle to be used the member 16 has the opening 30, extending entirely therethrough, which will enable a long needle to be held thereby.

In starting the machine with this invention the needle will have its pointed end adjusted to the proper distance beyond the jaws 9 and with the needle-carrying member in its uppermost position and the needle clamped therein by the thumb-screw 31. The machine is now adapted to operate without any attention on the part of the operator, so far as the needle is concerned, until the needle has been worn away sufficiently to cause the lower end of the needle-carrying member 16 to engage the upper end of the jaw-carrying extension 8. At this point it will be necessary to loosen the thumb-screw 31 and to move the needle-holding member 16 to its outermost position, which can be quickly done by rotating the screw-head 33. This being done the clamping-screw 31 is again tightened and the machine is ready for further automatic operation.

In order to get the proper result, the needle must be tightly clamped by the jaws 9, so that it will not have any independent movement therein. Continued long service may cause the engaging portion of the jaws to be worn by the rotation of the needle therein, and I have provided means for permitting the adjustment of these jaws to take up any wear thereof. This means consists in arranging the jaws 9 in the extension 8 at an angle and providing adjusting-screws 43. By forcing the jaws outward through the medium of these screws 43, owing to their relative angular positions, will cause their outer ends to be brought closer together and the needle to be tightly clamped.

In order to permit the free springing movement of the gear 22 in respect to the gear 21 as the bracket 24 swings upon its pivotal point, I preferably make the teeth of the gear 22 of such a shape as to permit this springing movement, as illustrated in Fig. 4.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a talking-machine, a diaphragm, a rotatable needle phonetically connected with the diaphragm, a rotatable needle-carrier, a gear operatively connected therewith, a shaft carrying at one end a gear operatively connected with said needle-carrier gear, a wheel rotated by contact with the record, and a worm-gear connection between the wheel and the opposite end of said shaft.

2. In a talking-machine, a diaphragm, a rotatable needle phonetically connected

therewith, means for rotating the needle, and automatically-actuated means for moving the needle longitudinally as the point thereof wears away.

3. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected therewith, and a means actuated by the movement of the record for rotating the needle and moving it longitudinally as the point of the needle wears away.

4. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, means for rotating and longitudinally moving the needle, the latter means controlled by the wearing away of the point of the needle.

5. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected therewith, means actuated by the movement of the record for rotating and longitudinally moving the said needle, the latter means controlled by the wearing away of the point of the needle.

6. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle, means for rotating the needle, means for moving the needle longitudinally, the latter means actuated by the downward movement of the diaphragm caused by the wearing away of the point of the needle.

7. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected therewith, means for rotating the needle, means for moving the needle longitudinally, the former means adapted to be actuated independently of and simultaneously with the latter means, and means controlled by the wearing away of the needle for throwing into operation the longitudinally-movable means.

8. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected therewith, means for rotating the needle, means for feeding the needle longitudinally, the rotatable means adapted to be operated independently of and simultaneously with the longitudinally-feeding means, and movable means in contact with the record adapted to throw the longitudinally-movable means into operation when the point of the needle wears away.

9. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, a rotatable screw-threaded longitudinally-movable needle-carrier, a screw-threaded member engaging the screw-threaded needle-carrier and adapted to rotate therewith, and means for holding the screw-threaded member against rotation to cause the longitudinal movement of the needle.

10. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm,

a rotatable and longitudinally-movable screw-threaded needle-carrier, a screw-threaded member in engagement therewith and adapted to rotate with it, and a lock adapted to hold the screw-threaded member against rotation to effect the longitudinal movement of the needle, the said lock controlled by the wearing away of the point of the needle.

11. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, a rotatable and longitudinally-movable screw-threaded needle-carrier, a screw-threaded member in engagement with the screw-threaded portion of the needle-carrier and adapted to rotate therewith, a lock for the screw-threaded member, and a member in engagement with the record adapted to cause the lock to engage the screw-threaded member when the point of the needle wears away.

12. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, a rotatable and longitudinally-movable screw-threaded needle-carrier, means actuated by the record for rotating the needle-carrier, a screw-threaded member in engagement with the needle-carrier and adapted to rotate therewith, a lock for the screw-threaded member adapted to be actuated by the downward movement of the diaphragm caused by the wearing away of the point of the needle and thereby carried into engagement with the screw-threaded member and holding it against rotation for causing the longitudinal movement of the needle-carrier.

13. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle, a rotatable and longitudinally-movable screw-threaded needle-carrier, means in engagement with the record for rotating the needle-carrier, said means being movably connected with the diaphragm, a screw-threaded member in engagement with the needle-carrier and adapted to rotate therewith, a lock for the screw-threaded member to cause longitudinal movement of the needle-carrier as it is rotated, the lock adapted to be engaged by the needle-rotating means which is in engagement with the record when the diaphragm is lowered by the wearing away of the point of the needle.

14. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, a rotatable and longitudinally-movable screw-threaded needle-carrier, a screw-threaded member in engagement with the needle-carrier and adapted to rotate therewith, a swinging member connected with the diaphragm, the swinging member carrying an operating-wheel in engagement with the record, the operating-wheel connected with the needle-carrier to rotate it, and a lock ac-

tuated by engagement with the swinging member for locking the screw-threaded member when the diaphragm is lowered by the wearing away of the point of the needle.

15. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected therewith, a rotatable sleeve, means actuated by the record and operatively connected with the sleeve to cause it to rotate, a rotatable and longitudinally-movable needle-carrier rotated by the said sleeve, the needle-carrier having a movement longitudinally through the sleeve, and means controlled by the wearing away of the point of the needle adapted to cause the needle-carrier to move longitudinally through the sleeve as the sleeve is being rotated.

16. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle phonetically connected with the diaphragm, a rotatable sleeve, means actuated by the record and operatively connected with the sleeve to cause it to rotate, a rotatable and longitudinally-movable needle-carrier passing through the sleeve and adapted to move longitudinally independently of the sleeve but locked against independent rotation, whereby the needle-carrier is rotated by the sleeve, a screw-threaded member in engagement with the screw-threaded portion of the needle-carrier and adapted to normally rotate therewith, a lock for the screw-threaded member, and means adapted to throw the lock in engagement with the screw-threaded member to hold it against rotation, said lock controlled in its engagement with the screw-threaded member by the wearing away of the point of the needle.

17. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle, a rotatable and longitudinally-movable screw-threaded needle-carrier, means actuated by the movement of the record and operatively connected with the needle-carrier to rotate it, the screw-threaded member adapted to normally rotate with the needle-carrier, a lock normally out of engagement with the screw-threaded member, and means controlled by the wearing away of the needle for causing the lock to be thrown in engagement with the screw-threaded member and holding it against rotation and thereby causing the longitudinal movement of the needle.

18. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle and adjustable jaws adapted to clamp the needle against lateral movement but permitting it to move longitudinally therethrough.

19. In a talking-machine, a diaphragm, a rotatable and longitudinally-movable needle, clamping-jaws for the needle phonetically connected with the diaphragm, and means for adjusting the clamping-jaws to take up any wear caused by the rotation of the needle.

20. In a talking-machine, a diaphragm, a

rotatable and longitudinally-movable needle, clamping-jaws phonetically connected with the diaphragm, said clamping-jaws consisting of arms longitudinally movable in a converging direction to clamp the needle, and means for moving the said jaws longitudinally.

21. In a talking-machine, a diaphragm, a longitudinally-adjustable needle phonetically connected therewith, means automatic-

ally actuated by an operative part of the machine and adapted to adjust the needle longitudinally in proportion to its wear at the point.

In testimony whereof I affix my signature 15
in presence of two witnesses:

MINARD A. POSSONS.

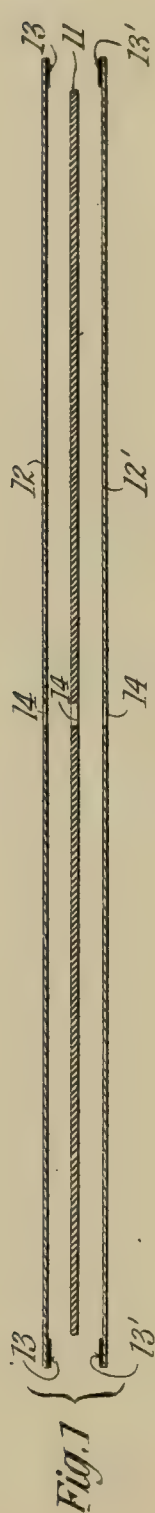
Witnesses:

FRED. T. BATCHELOR,
CHAS. H. BEHLEN.

No. 819,058.

PATENTED MAY 1, 1906.

H. GODWIN & A. HOFFMAN.
TABLET FOR SOUND RECORDS.
APPLICATION FILED JULY 26, 1906.



Witnesses
Gustave R. Thompson.
Wm. B. Heston

Harold Godwin
August Hoffman
Inventors
By Mauro Cameron Lewis & Massie
Attorneys

UNITED STATES PATENT OFFICE.

HAROLD GODWIN, OF HACKENSACK, NEW JERSEY, AND AUGUST HOFFMAN, OF NEW YORK, N. Y., ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TABLET FOR SOUND-RECORDS.

No. 819,058.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed July 26, 1905. Serial No. 271,330.

To all whom it may concern:

Be it known that we, HAROLD GODWIN, a resident of Hackensack, New Jersey, and AUGUST HOFFMAN, a resident of New York city, New York, citizens of the United States, have invented a new and useful Improvement in Tablets for Sound-Records, which is fully set forth in the following specification.

This invention relates to the building up of a disk tablet for sound-records having a facing of celluloid or the like; and its objects are to prevent warping or separation of the layers and to produce a sound-record characterized by cheapness and durability. A disk consisting of a single thin sheet of celluloid will warp and besides is sleazy and liable to puncture, &c. A single comparatively thick block of celluloid, while having sufficient body, is altogether too expensive for the purpose, while a tablet built up of a plurality of layers of thin celluloid, though having sufficient body, is yet quite expensive, and above all the adhesive cementing of the layers together seems to be the cause of warping. The broad idea of the present invention consists of cementing or uniting the layers together only around their margins and leaving the greater portion of the adjacent surfaces of the layers entirely or essentially free from any adhesive or positive cementing.

In the drawings annexed hereto, Figure 1 is a sectional view through one of our new built-up record-tablets, but showing the layers exaggerated in thickness and separated from each other. Fig. 2 is a similar view of a modification; Fig. 3 is a similar view of still another modification, and Fig. 4 represents the completed article.

In carrying out one form of our invention we take a disk 11 of ordinary bristol-board (three-ply or more) or the like of a diameter about one-eighth of an inch less than the ultimate record. We next take two disks 12 12' of (thin) celluloid or the like of the desired diameter, so that when placed concentrically the two celluloid disks will extend beyond (or overlap) the bristol-board disk by a margin 13 13' of about one-sixteenth of an inch. (See Fig. 1.) We then apply a

suitable adhesive (acetone or other cement) around these margins and finally, arranging the layers concentrically, as seen in Fig. 1, the whole is placed in a suitable press and compressed together. By the same operation a sound-record may be impressed into each (or either) of the celluloid faces by means of suitable sound-record matrices in the press, or the sound-record may be imparted to our new tablet subsequently.

According to Fig. 2, the bristol board 11 is omitted, and the two sheets 12 12' of celluloid or the like are united together, as before, at 13.

According to Fig. 3, only one disk 12, of celluloid or the like, is employed, being cemented directly at 13 to the disk 11, of bristol-board or the like, which latter in this case is of the same diameter as disk 12. The disk 11, however, will preferably be rendered water-proof.

In the several figures 14 indicates the pin-hole for engaging the stud or pin on the turntable of the talking-machine. Around the margin of this hole may be applied a belt or zone of cement.

Although the cement has been spoken of as applied only in a narrow rim or margin, yet in practice it will spread or run more or less; but this is not material. The greater portion of the adjacent surfaces will be essentially free from an adhesive.

Having thus described our invention, we claim—

1. A tablet for sound-records, comprising a plurality of layers connected together only around their margins.

2. A tablet for sound-records, comprising a plurality of layers, the greater portion of whose adjacent surfaces is essentially free from an adhesive.

3. A tablet for sound-records, comprising a layer of celluloid and a layer of bristol-board, the greater portion of whose adjacent surfaces is essentially free from an adhesive.

4. A tablet for sound-records, comprising two layers of celluloid secured together only around their margins.

5. A tablet for sound-records comprising

two enveloping layers of celluloid secured together only around their margins, and an interior layer of bristol-board or the like.

6. A tablet for sound-records comprising
5 two layers of different material held together but the greater extent of whose surfaces is essentially free from any adhesive.

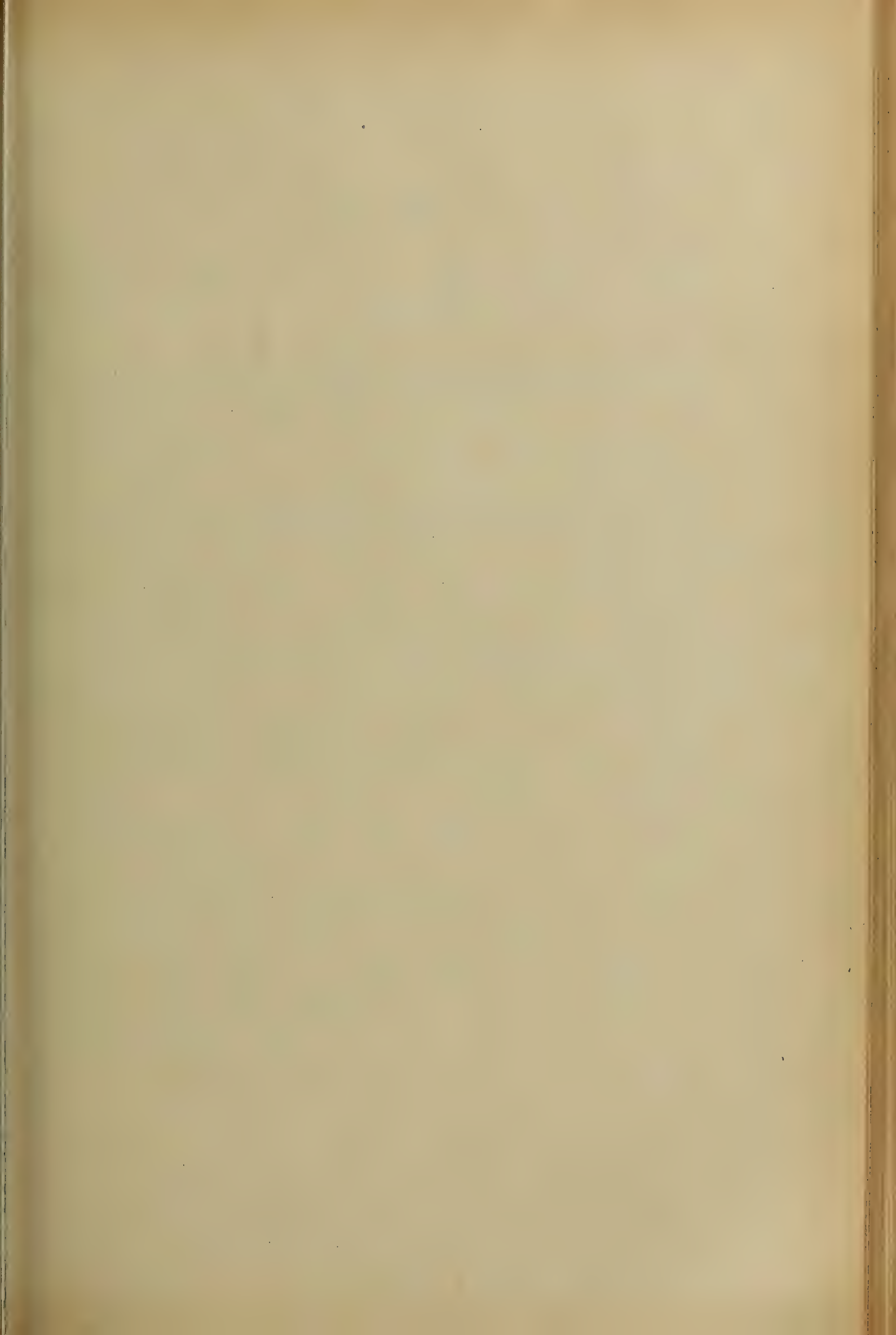
In testimony whereof we have signed this

specification in the presence of two subscribing witnesses.

HAROLD GODWIN.
AUGUST HOFFMAN.

Witnesses:

G. A. MANWARING,
WM. HACKLAND.



No. 819,072.

PATENTED MAY 1, 1906.

G. A. MANWARING.

SOUND RECORD.

APPLICATION FILED JULY 26, 1905.

Fig. 1

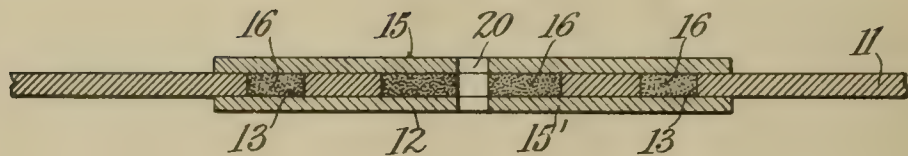


Fig. 2

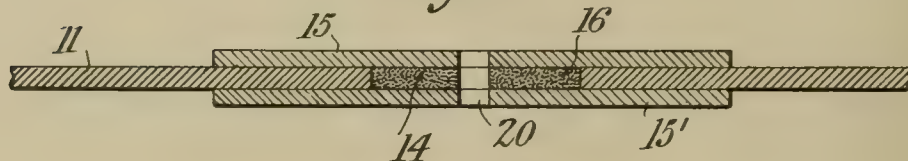
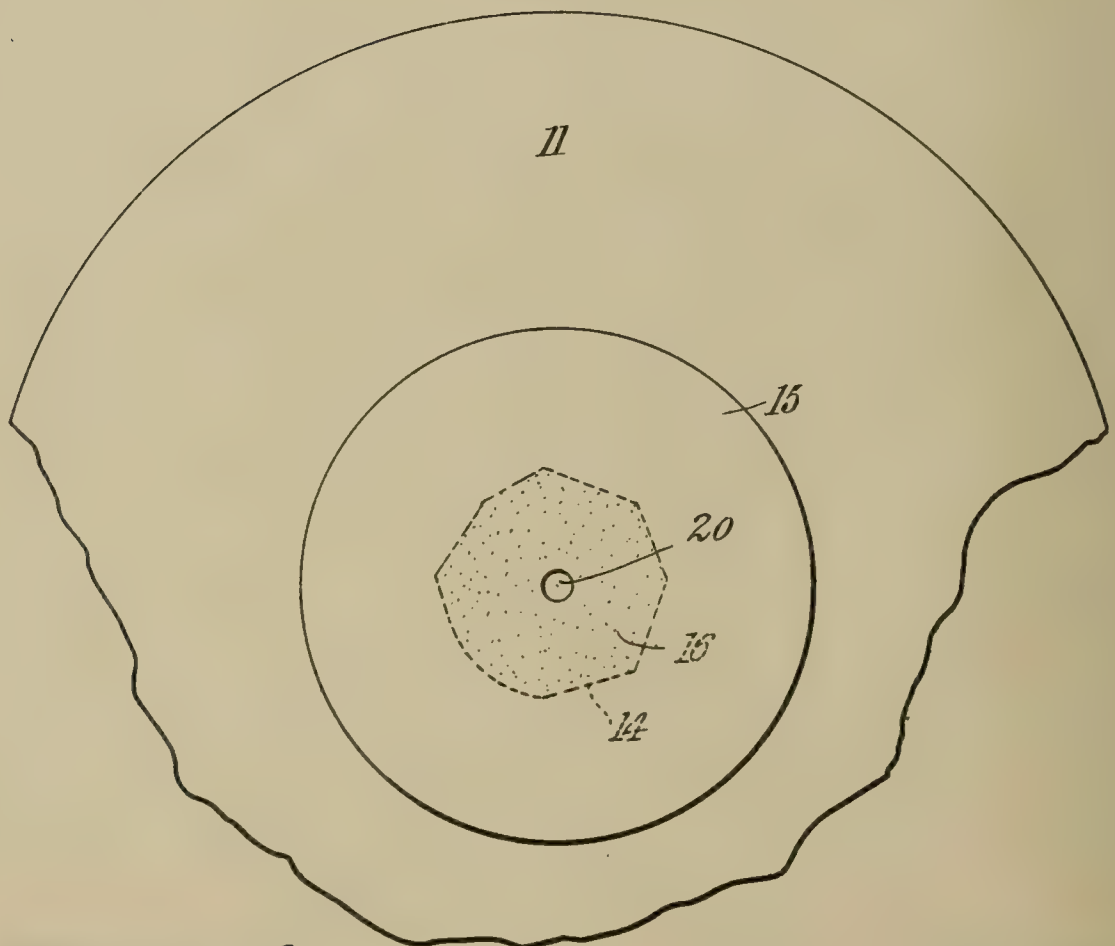


Fig. 3



Witnesses
Gustave R. Thompson.
J. H. Kerkham.

Inventor
George A. Manwaring
By His Attorneys
Maurice Cameron Lewis Masie

UNITED STATES PATENT OFFICE.

GEORGE A. MANWARING, OF BAYONNE, NEW JERSEY, ASSIGNOR
TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT,
CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-RECORD.

No. 819,072.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed July 26, 1905. Serial No. 271,328.

To all whom it may concern:

Be it known that I, GEORGE A. MANWARING, a citizen of the United States of America, and a resident of Bayonne, Hudson county, New Jersey, have invented a new and useful Improvement in Sound-Records, which improvement is fully set forth in the following specification.

This invention relates to disk sound-records and the labels carried thereby.

In dealing with record-tablets of celluloid or the like it has been found that the paper of which the label is composed will not adhere to the celluloid surface. The difficulty appears to lie in finding an adhesive which acts permanently both upon celluloid and upon paper. My present invention enables me to secure a paper surface to another paper surface upon the other side of the disk-record through an opening cut in the record-tablet for that purpose.

My invention will best be understood by referring to the accompanying drawings, which illustrate an embodiment thereof as applied to disk sound-records.

Figure 1 is a sectional view, greatly exaggerated in thickness, of a disk record-tablet having its label secured thereto in conformity with my present invention. Fig. 2 is a modification, and Fig. 3 is a plan view illustrating the invention.

In the drawings, 11 represents the record-tablet. Through the central portion of this tablet I make one or more comparatively large openings 12 13 14, &c.

15 15' represent two small disks of paper, either or each of which bears a label.

16 represents a glue or other adhesive which secures the opposing surfaces of these paper disks 15 and 15' where the same are exposed to each other through the openings 12 13 14, &c.

20 indicates the central pin-hole for engaging the stud on the turn-table of the talking-machine.

The least rigidity in the paper disks 15 and 15' suffices to keep them flat against the record-tablet 11.

Fig. 1 shows a large central opening 12, with several additional openings 13. Fig. 2 indicates a single non-circular opening 14, made around the center of the record-tablet.

Having thus described my invention, I claim—

1. The combination with a disk record-tablet and a label therefor of paper or the like, of a second disk of the last-named material at the back of said record-tablet, and means extending through said record-tablet for securing said paper disks together.

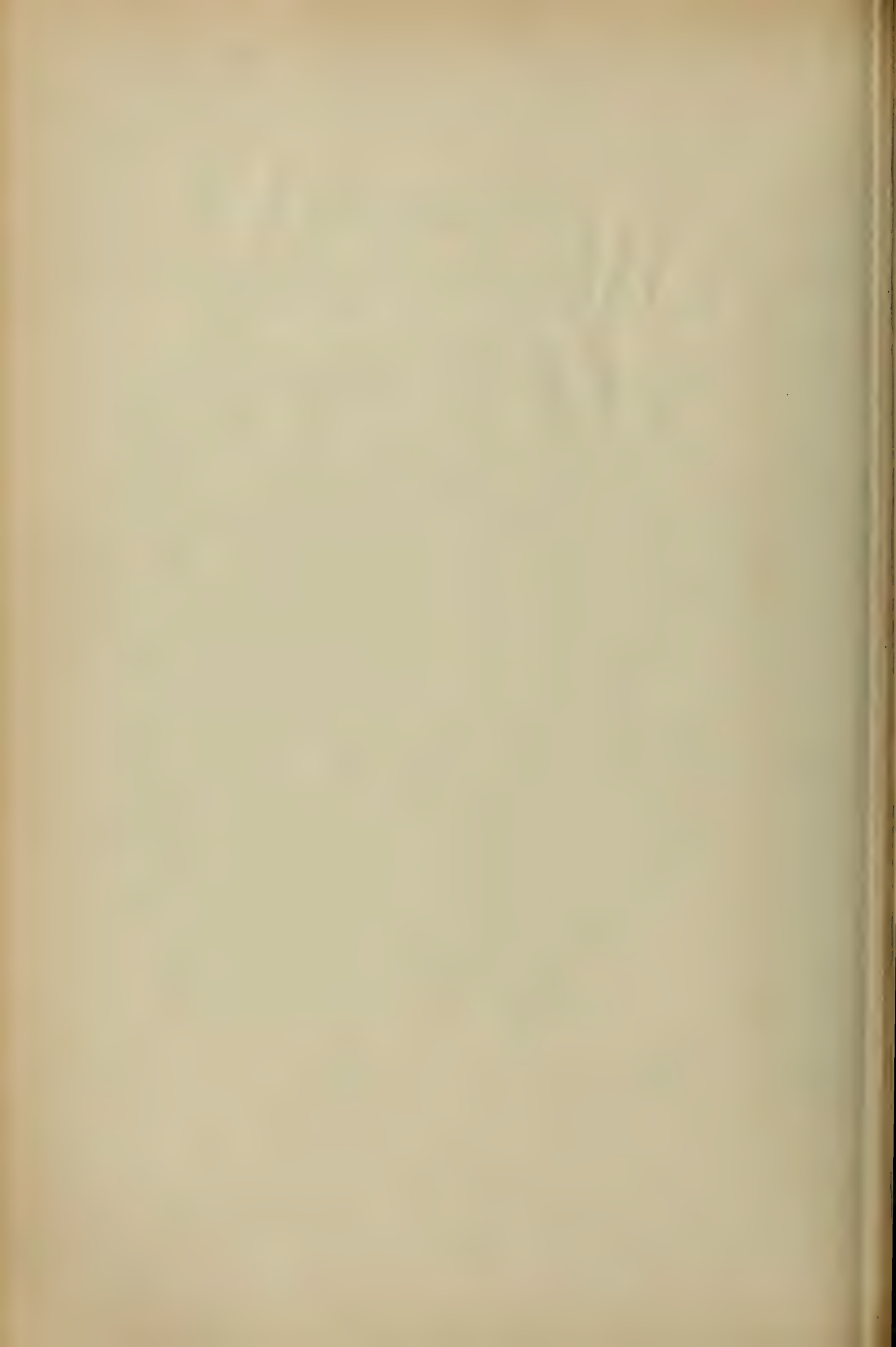
2. The combination with a record-tablet having one or more holes therethrough, of a tablet of paper or the like upon each side of the said record-tablet, and a glue located in said holes and securing said paper disks together.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE A. MANWARING.

Witnesses:

C. A. L. MASSIE,
W. H. HARTING.



P. O. PEDERSEN
MECHANISM FOR OPERATING THE RECORDING AND REPRODUCING
MECHANISMS OF TELEGRAPHONES.

APPLICATION FILED JUNE 21, 1901.

Fig. 1.

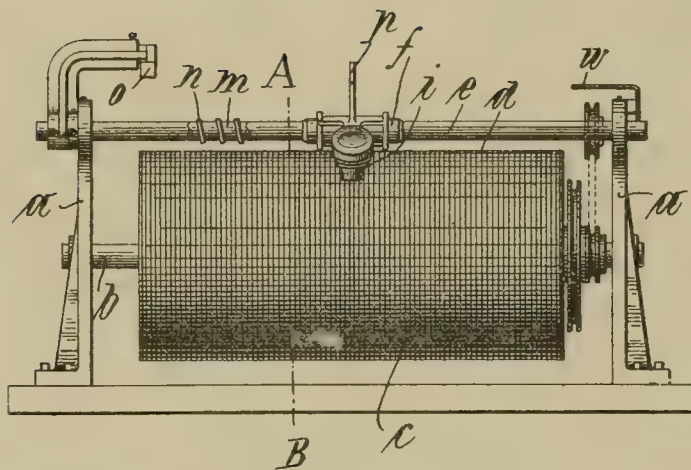


Fig. 2.

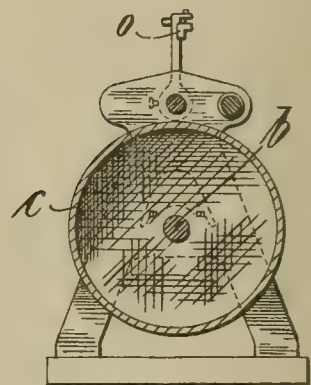


Fig. 5.

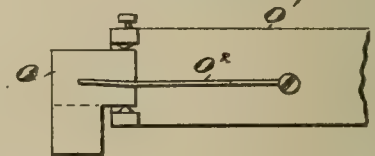


Fig. 4.

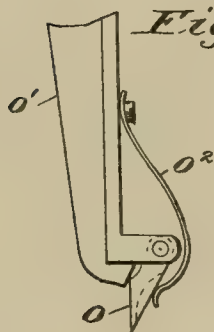
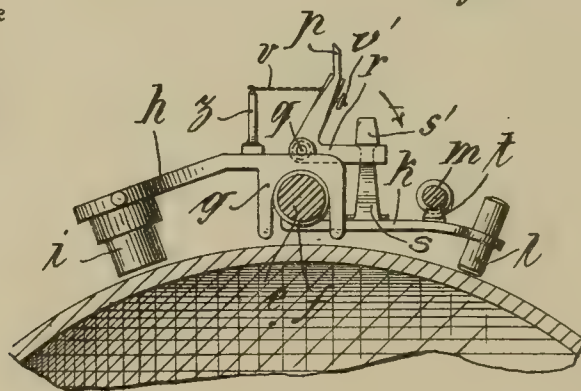


Fig. 3.



Witnesses:
Waldo M. Chapin
Frank O. Ober

Inventor
Peder O. Pedersen
by Wm. A. Rosinbaum
Att. atty.

UNITED STATES PATENT OFFICE.

PEDER OLUF PEDERSEN, OF COPENHAGEN, DENMARK.

MECHANISM FOR OPERATING THE RECORDING AND REPRODUCING MECHANISMS OF TELEGRAPHONES.

No. 819,670.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed June 21, 1901. Serial No. 65,423.

To all whom it may concern:

Be it known that I, PEDER OLUF PEDERSEN, a subject of the King of Denmark, residing at Copenhagen, in the Kingdom of Denmark, have invented certain new and useful improvements in the mechanism for operating the recording and reproducing electromagnet in apparatus for magnetically recording and reproducing speech, signals, messages, and the like, of which the following is a specification.

This apparatus relates to phonographs, or machines for recording and reproducing speech, messages, or signals, with particular reference to the instrument known as the "telegraphone," which is described in United States Letters Patent No. 661,619, dated November 13, 1900.

The object of the present invention is to produce an automatically-moving carrier for the recording and reproducing magnet, said carrier to be capable of traversing forward and back over the recording-surface as long as the instrument is in motion to record or obliterate a message or reproduce a message as many times as desired.

The particular device herein described is intended especially for an instrument in which the recording-body is in the form of a wire wound spirally upon the surface of a horizontal cylinder. It has been proposed heretofore to feed the magnet along the wire by means of the mechanical engagement between the poles of the magnet and the convolutions of wire, the magnet resting by its weight upon the wire, so that as the cylinder is turned the spiral arrangement of the wire will cause the magnet to be moved along on its guides. In the present case the engagement between the magnet and the wire is not relied upon to move the magnet, but instead thereof an independent element connected with the same carriage which supports the magnet engages with the spirally-wound wire to move the carriage and magnet across the face of the cylinder in one direction, while in the other direction the same device is used in connection with a separate reverse screw or spiral to return the carriage and magnet to its starting-point.

The present invention also provides automatic devices at each end of the cylinder to shift and trip the feed devices so that the direction of motion will be reversed.

The invention will be fully described in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a telegraphone with my improvements attached thereto. Fig. 2 is a section on line A B of Fig. 1. Fig. 3 is a sectional view of the carriage and a portion of the cylinder. Figs. 4 and 5 are a plan and elevation of the reversing mechanism at one end of the cylinder.

The standards *a* support the horizontal shaft *b*, upon which is mounted the cylinder *c*, whose surface carries a spirally-wound magnetizable wire *d*, extending from end to end thereof. The cylinder is to be continuously rotated in any suitable way, a pulley being shown at one end for this purpose. Above the cylinder and parallel thereto are arranged a smooth rod *e* and a second rod *m*, having a spiral thread *n* on it from end to end, said spiral being of much coarser pitch than that of the wire *d*. On the rod *e* is a sleeve or carriage *f*, to which is attached a rearwardly-extending arm *k*, which passes below and beyond the rod *m*, and carries at its outer end a tooth *l*, directed toward and adapted to engage with the wire *d*, the tooth being weighted, as shown, to afford a good mechanical connection with the wire. On the upper side of arm *k* is another tooth or half-nut *t*, adapted to engage with the thread on the rod *m*.

s is an upwardly-reaching spring-arm having a head *s'*, affording a shoulder on its under side, forming a hook. On the upper side of sleeve *f* is pivoted at *q* a bell-crank *r*, having one arm projecting rearwardly and closely beside the spring *s* and the other projecting upwardly and having a finger *p*. When the rearwardly-projecting arm of the bell-crank is tipped sufficiently low, the head *s'* on the spring-arm will pass over and rest upon its upper edge, preventing the arm from rising until it is released.

g g are two forks resting over the extremities of the sleeve *f* and connected together by an arm *h*, which also supports the recording and reproducing magnet *i*, the latter being thus free to swing on the sleeve *f*. On the upper side of arm *h* is a post *z*, the end of which connects with the upwardly-projecting arm of the bell-crank *r* by means of a chain *v*, which is adjustable in length by means of the screw *v'*, to which its end is attached. When the bell-crank is engaged by

the hook *s'*, the weight of the magnet *i* and arm *h*, acting through the parts *v*, *r*, *s*, and *k*, lifts the tooth *l* out of engagement with the wire *d* and holds the half-nut *t* in engagement with the thread on the rod *m*. At the same time in order that the bell-crank may engage with the hook *s'* it must tip so far rearward as to lift the magnet *i* well out of contact with the wire *d*, so that when the magnet falls back and lifts arm *k* it is prevented from touching the wire *d* by nut *t* resting against the rod *m*. On the other hand, when the hook *s'* is out of engagement with the bell-crank both arms *h* and *k* are allowed to fall and carry their respective parts *i* and *l* into engagement with the wire *d*, which is the operative condition when recording, reproducing, or obliterating.

At the left-hand end of the instrument is a bracket *o'*, to which is pivoted on a vertical axis a blade *o*, normally held in a plane oblique to the axis of cylinder *c* by a spring *o*². The lower half of this blade is in the path of movement of the finger *p* on the bell-crank *r*, and this portion of the blade is thinner than the upper portion, its thickness being indicated by the dotted lines in Fig. 4. In its normal position the blade rests against a portion of the bracket *o'*, as shown in Fig. 4, in which position the blade is adapted to be struck near its forward edge by the said finger *p* in its traverse to the left. The bell-crank is thereby tilted rearward, owing to the inclined position of the blade, and is thrown beneath the hook *s'*, where it is caught. Thus the movement of the carriage to the left is interrupted and its movement to the right simultaneously commenced. In starting to the right the finger *p* strikes the opposite side of the blade *o*, which then yields on its pivot and allows the finger to pass. At the right-hand end of the cylinder a bent arm *w* is fixed, with its end in the path of movement of the head *s'* on arm *s*, so that when the carriage completes its extreme movement to the right the hook *s'* is struck and moved out of engagement with the bell-crank, whereupon the magnet *i* and the tooth *l* are allowed to fall into engagement with the wire *d*.

In the operation of the instrument the cylinder *c* and the rod *m* are continuously rotated. To record speech, the speaking should usually commence when the carriage is at the right-hand end of the cylinder. As the speaking continues the carriage is fed along toward the left by the mechanical engagement between the tooth *l* and the spiral wire *d*. At the same time the poles of the magnet *i* are dragging in contact with the same wire. When the wire has been completely traversed by the magnet, the carriage is at the left-hand end of the cylinder. The bell-crank is then tilted rearward by the blade *o* and the direction of movement of the

carriage is reversed, the carriage traveling quickly toward the right-hand end of the cylinder by reason of mechanical engagement between the half-nut *t* and the rod *m*. As soon as the carriage reaches the right-hand end of the cylinder its direction of movement is again reversed by contact with the arm *w* and the record previously made will now be reproduced, while the carriage again travels to the left. The carriage will continue to travel forward and back until the motor which drives the cylinder is stopped, and as many reproductions of the record can be made as desired.

Having described my invention, I claim—

1. In a phonographic apparatus, the combination with the record-receiving surface or body, and a carriage movable with respect to each other, said carriage adapted to carry a recording or reproducing device, of means independent of said recording or reproducing device, and actuated by the said record-receiving surface or body, for moving the carriage and surface or body with respect to each other.

2. In a phonographic apparatus, the combination with a record-receiving surface or body, of a recording or reproducing device acting upon one part of said surface or body, and a feeding device acting upon another part of said surface or body for the purpose of feeding the recording or reproducing device with respect to said surface or body.

3. In a phonographic apparatus, the combination with a record-receiving surface or body in the form of a spiral, a carriage for the recording and reproducing devices, devices adapted to engage with the record-receiving surface or body to cause a movement of the carriage and means for reversing the direction of movement of the carriage at the end of a traverse.

4. In a phonographic apparatus, the combination with a record-receiving surface in the form of a spiral, of a carriage, a recording or reproducing device coöperating with said surface or body and supported by said carriage, and a tooth also supported by said carriage and adapted to engage with said spiral surface or body for the purpose of moving the carriage when the surface or body rotates.

5. In a phonographic apparatus, the combination of a record-receiving surface or body in the form of a spiral, a threaded rod arranged parallel thereto, a carriage for the recording and reproducing feeding devices, devices carried by said carriage for engaging with either the recording body or surface or the threaded rod, and means for lifting the said devices out of engagement with the rod and into engagement with the surface or body and vice versa.

6. In a phonographic apparatus, the combination of a record-receiving surface or body, a carriage adapted to carry the recording and

reproducing devices, means connected with said carriage and adapted to engage with the record-receiving surface or body to move the carriage, and means for lifting the recording or reproducing devices out of operative relation with said surface and reversing the direction of travel of the carriage.

7. In a phonographic apparatus, the combination with the record-receiving surface or body, of a carriage, two arms carried thereby and pivoted so as to rest against the record-receiving surface or body, recording and reproducing devices carried by one arm and a feeding device carried by the other arm and means for lifting said arms out of contact with said surface or body, for the purpose set forth.

8. In a phonographic apparatus, the combination with a record-receiving surface or body, a traveling carriage, two pivoted arms projecting from said carriage, one of said arms carrying the recording or reproducing devices and the other engaging with the recording-surface in order to move the carriage, a latch adapted to hold the two arms out of operative relation with the recording-surface and means located at the extremities of the record-receiving surface or body for re-

spectively engaging and disengaging the said latch.

9. In a phonographic apparatus, the combination with a record-receiving surface or body, and a guide-rod arranged parallel thereto, of a sleeve on said guide-rod, an arm projecting from said sleeve and carrying a feeding device adapted to engage with the record-receiving surface or body for the purpose of moving the sleeve along the rod, a second arm loosely connected with said sleeve and adapted to carry the recording and reproducing devices, the said two arms projecting from opposite sides of the sleeve, a lever pivoted to the sleeve and connected with the second-mentioned arm, a latch carried by the first-mentioned arm and adapted to be engaged by said lever, whereby the two arms may be connected together so that the weight of one will offset that of the other and means for engaging and disengaging said latch.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

PEDER OLUF PEDERSEN.

Witnesses:

E. S. HAZEMANN,
V. POULSEN.

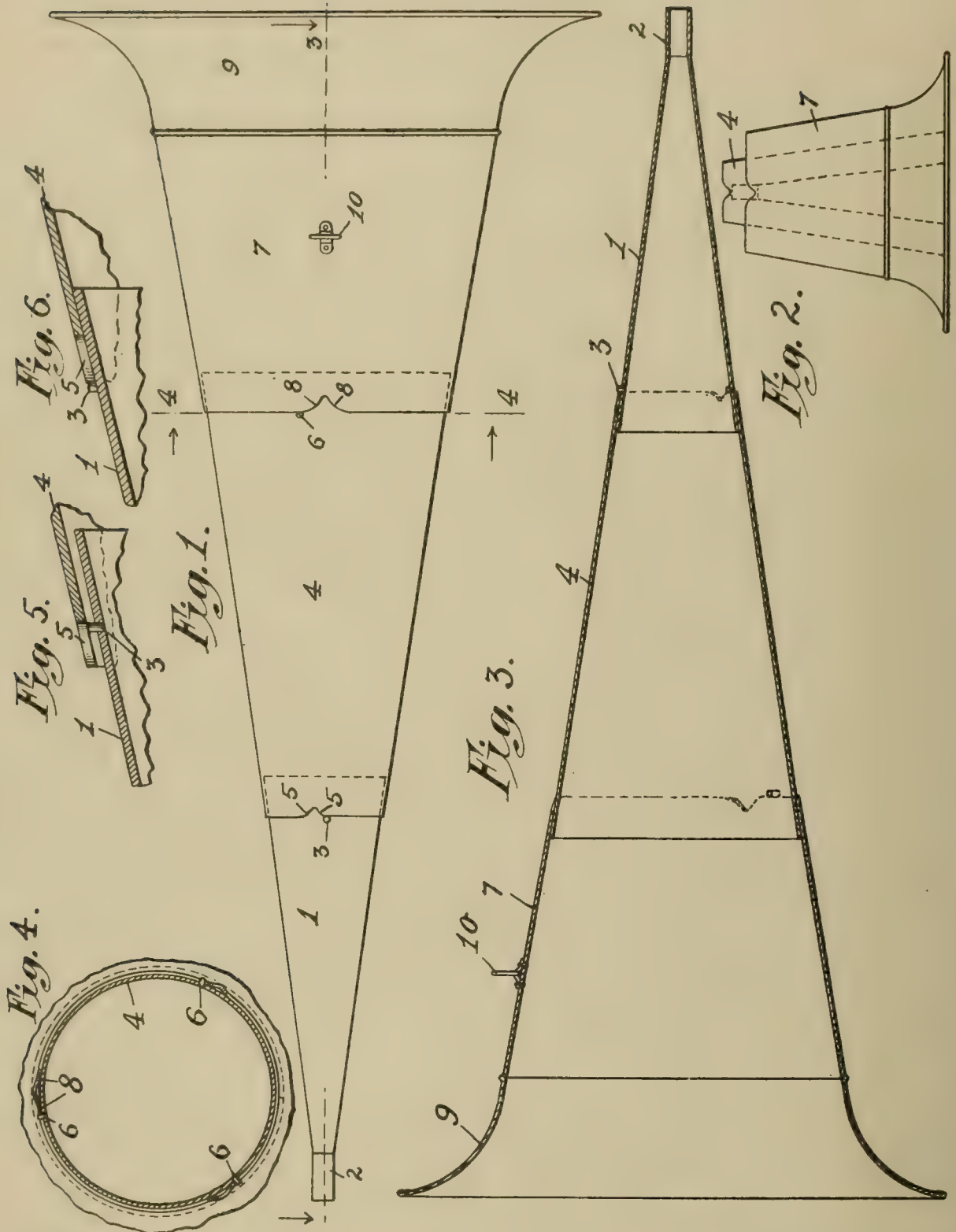
No. 820,158.

PATENTED MAY 8, 1906.

P. WEBER.

PHONOGRAPH HORN.

APPLICATION FILED FEB. 21, 1905.



Attest:
Edgeworth
De los Holden

Inventor:
Peter Weber
by *Frank L. Weber* Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-HORN.

No. 820,158.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed February 21, 1905. Serial No. 246,669.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

My invention relates to collapsible horns for use principally in connection with phonographs or other talking-machines, although it is obviously capable of other uses.

My invention operates, broadly, upon the same general principle as the horn described and claimed in an application filed by me June 29, 1904, Serial No. 214,595, in which tapered sections are locked together by a projection upon one section pressing against an inclined shoulder upon the other section, so that a rotary movement of one section with respect to the other causes a relative longitudinal movement of the section, and on account of their tapering form jams them tightly together, so as to produce a continuous horn possessing as great or greater rigidity than one constructed of a single piece of metal.

My invention comprises certain new and useful improvements in the class of horn just referred to, which will be pointed out and claimed.

Reference is hereby made to the accompanying drawings, in which the same numerals of reference designate corresponding parts in the several views, of which—

Figure 1 is a side elevation showing the sections of the horn in their assembled relation. Fig. 2 is an elevation, on a smaller scale, showing the horn with the sections nested. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a section, partly broken away, on line 4 4 of Fig. 1. Figs. 5 and 6 are detail sectional views showing the locking pins or projections and cooperating shoulders on an enlarged scale, Fig. 5 showing the relative positions of these parts when the projection is first placed in engagement with the shoulder and Fig. 6 the relative positions after the projection has been caused to ride up on the shoulder, so as to jam the sections firmly together.

As preferably constructed, the horn consists of three sections, although a smaller or greater number may be used. The smallest section 1 is provided at one end with the tube

2 for receiving a flexible connection with the talking-machine. The large end of this section is provided with a number of pins or projections 3. These projections are preferably three in number and are situated at intervals of one hundred and twenty degrees around the circumference of the section, although obviously any number of pins may be used. The second section 4 is preferably shaped as shown in the drawings, that edge which is adjacent the section 1 being formed with inclined shoulders 5. In the prior construction referred to inclined shoulders were provided by forming slots in one of the sections; but such an arrangement is less desirable than my present improvement, since the appearance is not so attractive and also because when the metal between the slot and the edge of the section is narrow it is likely to become bent or distorted by careless handling of the horn, so that it becomes difficult to lock the sections together. Furthermore, my present construction is simpler, its mode of operation is more easily comprehended by the average user, and it is easier to place the pins against the cooperating shoulders in assembling the device than to insert them in the slots above referred to.

It will be observed that since the shoulders 5 occur in pairs sloping in opposite directions the sections 1 and 4 can be locked together by turning one section in either direction with respect to the other. In order to unlock the sections, it is only necessary to give them a slight movement in a reverse direction to that by which they are locked, so that the projection on one section rides down the inclined shoulder a short distance, whereupon the sections become loosened and may be easily separated by direct longitudinal movement. (See Figs. 5 and 6.) The section 4 is provided at its enlarged end with projections 6, similar to the projections 3 of the section 1. The section 7 is provided at its small end with inclined shoulders 8, similar to the shoulders 5, and its large end is flared to form the bell 9, with which such devices are usually provided. A ring 10 is preferably secured to this section for the purpose of supporting the same.

Obviously the locking-pins may project from the interior of one of the sections at its small end and cooperate with locking-should-

ders formed on the other section at its large end. In this case when the sections are locked together the locking means will be entirely concealed within the body of the horn, and the margin of the sections which is visible may be formed with any desired contour. The positions of the sections in which they are free to be separated longitudinally will then be preferably indicated by any suitable external marking.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a device of the character described, a tapered section whose limiting edge is inclined with respect to a plane perpendicular to its axis and a second tapered section having a projection adapted to press against said inclined edge, whereby relative rotary movement of the sections causes relative longitudinal movement thereof and locks them rigidly together, substantially as set forth.

2. In a device of the character described, a tapered section whose limiting edge comprises a plurality of shoulders each of which is inclined with respect to a plane perpendicular to its axis and a second tapered section having a plurality of projections adapted to press against said inclined shoulders, whereby relative rotary movement of the sections causes relative longitudinal movement thereof and locks them rigidly together, substantially as set forth.

3. In a device of the character described a tapered section provided with a pair of shoulders oppositely inclined with respect to a plane perpendicular to its axis and a second

tapered section having a projection adapted to press against either of said inclined shoulders whereby relative rotary movement of the sections in either direction causes relative longitudinal movement thereof and locks them rigidly together, substantially as set forth.

4. In a device of the character described, a tapered section whose limiting edge comprises a pair of shoulders oppositely inclined with respect to a plane perpendicular to its axis and a second tapered section having a projection adapted to press against either of said inclined shoulders, whereby relative rotary movement of the sections in either direction causes relative longitudinal movement thereof and locks them rigidly together, substantially as set forth.

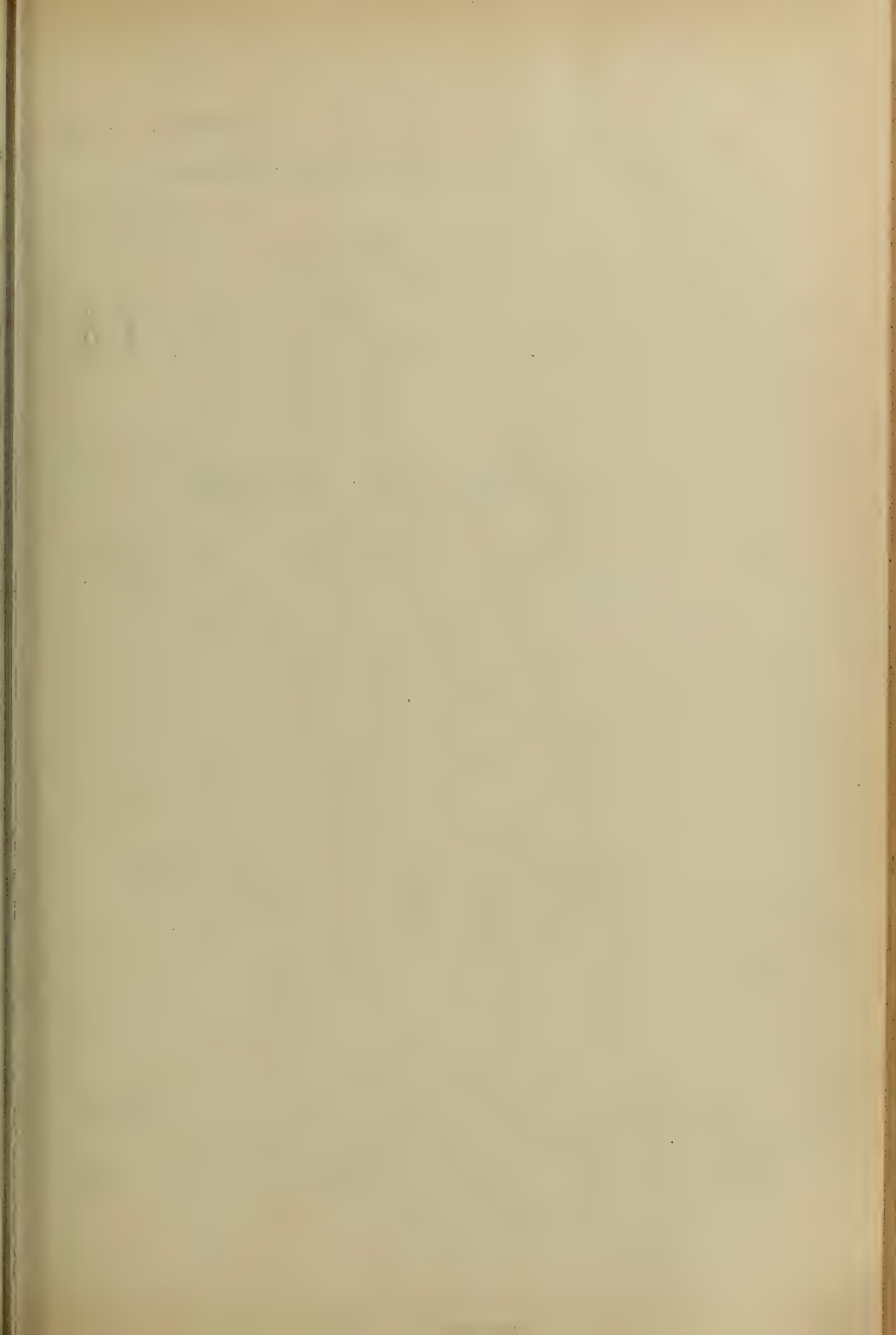
5. In a device of the character described, a tapered section whose limiting edge comprises a plurality of pairs of shoulders oppositely inclined with respect to a plane perpendicular to its axis and a second tapered section having a plurality of projections adapted to press against similarly-inclined shoulders of each pair, whereby relative rotary movement of the sections in either direction causes relative longitudinal movement thereof and locks them rigidly together, substantially as set forth.

This specification signed and witnessed this 20th day of February, 1905.

PETER WEBER.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM



E. L. AIKEN.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED OCT. 31, 1905.

2 SHEETS—SHEET 1

Fig. 1.

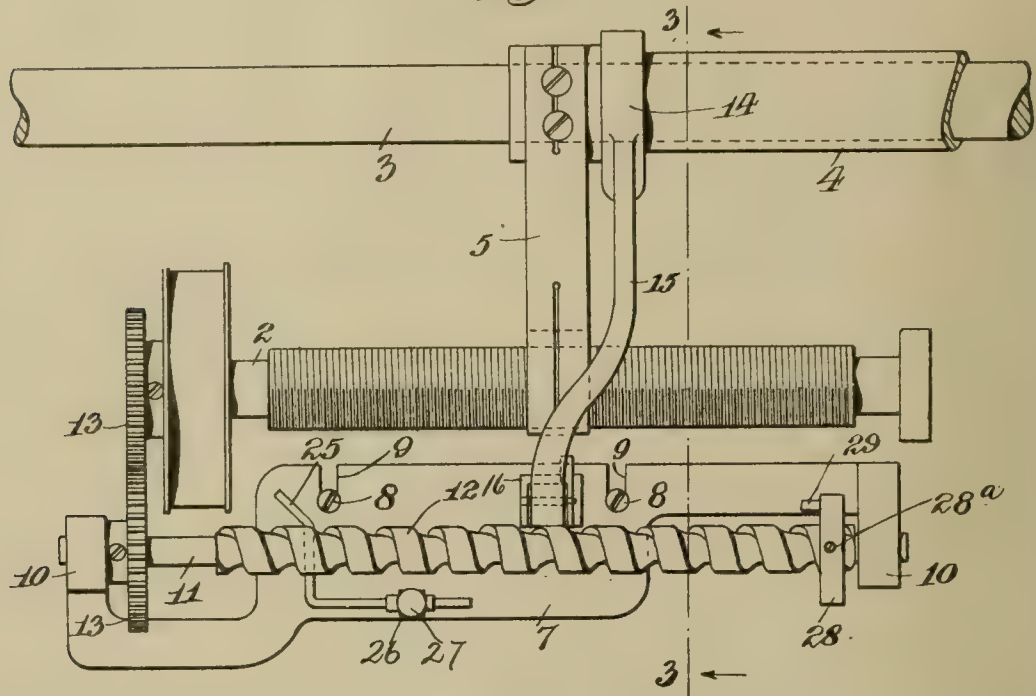
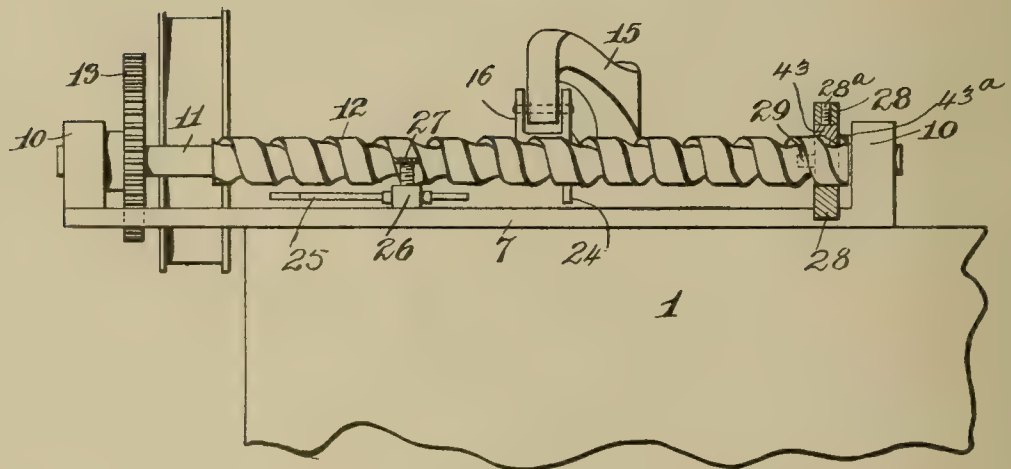


Fig. 2.



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Edgeworth Street
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Inventor:

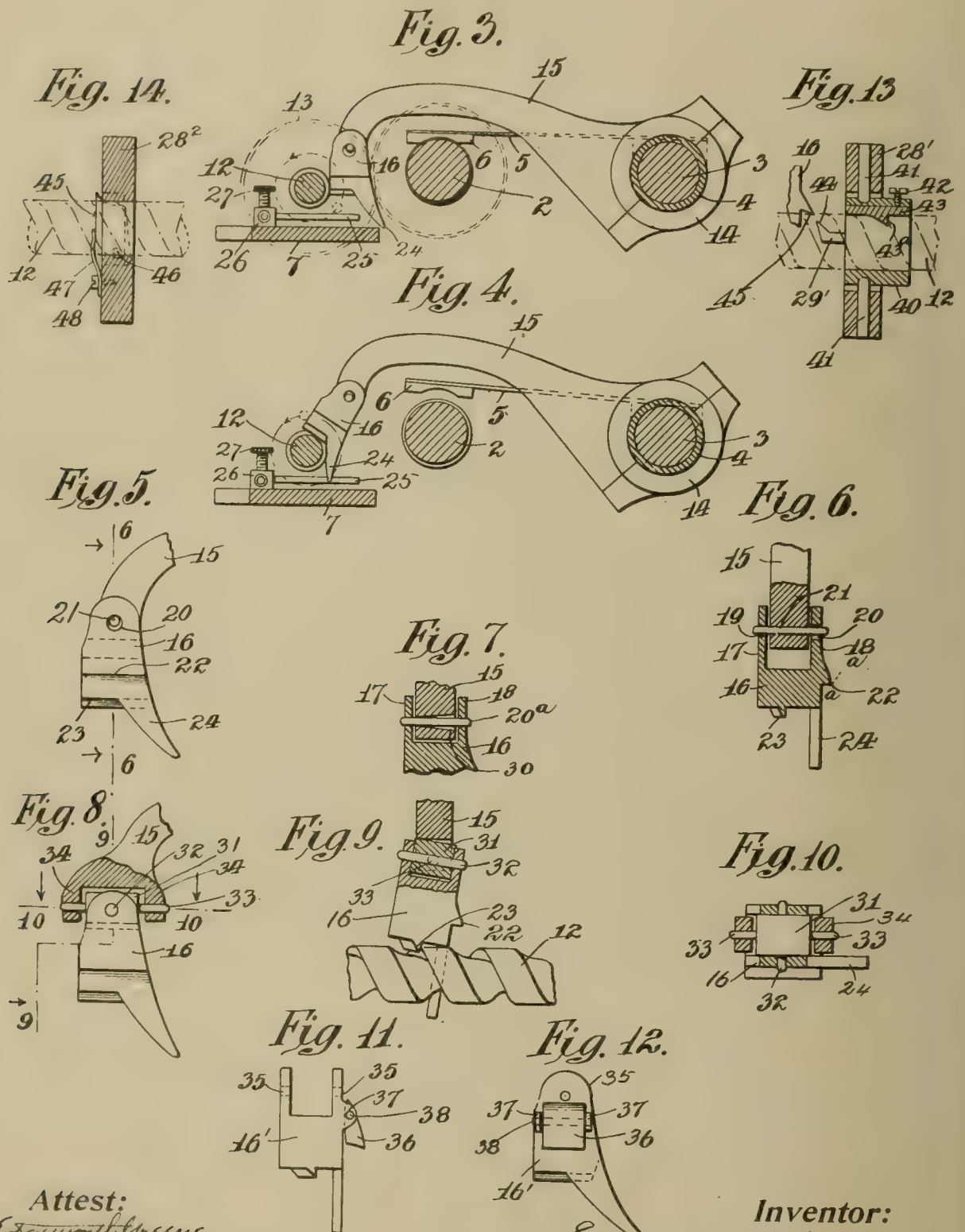
Edward L. Aiken

by Frank L. Myers Atty.

E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED OCT. 31, 1905.

2 SHEETS—SHEET 2



Attest:
Edgarworth Greene
Deputy Notary.

Inventor:
Edward L. Aiken
by *Frank L. Aiken* Att'y.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

No. 820,165.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed October 31, 1905. Serial No. 285,232.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Repeating Attachments for Phonographs, of which the following is a description.

My invention relates to phonograph repeating attachments of the type wherein the lifting operation by which the feed-nut is disengaged from the feed-screw is effected by means of a rotating lifting pin or projection which engages a contact member in the form of a dog carried by and traveling with the sound-box carriage and pivoted on an axis parallel to the direction of movement of the said carriage. Devices of this character are well known in the art. (See, for example, United States Letters Patent No. 583,679, dated June 1, 1897, to Fletcher, and Patent No. 678,890, dated July 23, 1901, to Matthews.) In these patents the pivoted dog operates as a lever for effecting the elevation of the sound-box carriage. When it is attempted to effect the elevation by a direct lift of the rotating pin upon a pivoted dog, it is found that special devices are necessary to produce a structure which will be operative when applied to phonographs of the usual construction, for the reason that in such instruments the pitch of the feed-screw is only one one-hundredth of an inch, so that the first contact of the rotating member and traveling member cannot be more than one one-hundredth of an inch in width and may be anything less. This width of contact is not sufficient to accomplish the lifting of the sound-box carriage with any degree of certainty, because the rotating member moves at a high rate of speed and strikes the traveling member with considerable violence, the usual result being that the carriage is lifted sufficiently to disengage the feed-nut from the feed-screw, and the carriage is then pushed or hurled in a backward direction, so that the lifting-pin and traveling dog are separated, whereupon the carriage falls, to be again fed toward the rotary lifting member. The mechanism referred to may occasionally operate when the width of initial contact is at its maximum (one one-hundredth of an inch) and before the parts have become worn

to any appreciable extent; but even under the most favorable conditions the device will fail so often as to be worthless for any practical purpose. It is therefore necessary in designing a device of this type to provide special means for obtaining a sufficient width of overlap of the traveling dog or contact member and rotary lifting member as to make the device reliable and certain in operation. This fact was pointed out by me in Patent No. 798,087, granted August 29, 1905, and a special construction for accomplishing this result was therein disclosed and claimed. This structure, however, requires accurate setting—that is, the lifting-pin and pivoted dog cannot vary much from the relative positions shown in the drawings of the said patent.

It is the object of the present invention to produce a device in which sufficient overlap of the lifting-pin with respect to the pivoted dog can be obtained for the lifting operation, and which device will at the same time admit of a considerable variation in the relative positions of these parts without its operative-ness being impaired. In other words, it will not require accurate setting, so that unskilled persons may apply the device to phonographs, and it will also possess the same advantages as the structure of said Patent No. 789,087. in that the device will be effective and positive in its operation, of but few parts, and will not in any way affect the operation of the phonograph or prevent the reproducer from being fully raised to permit the records to be applied to or removed from the mandrel, being at the same time readily adjustable, so that the reproducer may be caused to engage and be disengaged from the record at any desired point—as, for instance, immediately before and after the selection has been reproduced.

Reference is hereby made to the accompanying drawings, in which—

Figure 1 is a plan view showing a part of the main shaft, feed-screw, back rod, sleeve, and feed-nut spring-arm of a phonograph with my present improvements applied thereto. Fig. 2 is a front view of the same. Fig. 3 is a section on line 3 3 of Fig. 1, showing the repeating mechanism out of operation, as when the reproducer is in engagement with the record. Fig. 4 is a similar section showing the repeating mechanism in op-

eration, as when the sound-box carrier is being returned to its initial position. Fig. 5 is a detail side view of the pivoted dog and the forward end of the arm by which it is carried.

Fig. 6 is a section on line 6 6 of Fig. 5. Fig. 7 is a section similar to Fig. 6 of a modification of the contact member. Fig. 8 is a view similar to Fig. 5, but partly in section, showing a second modification of the contact member. Fig. 9 is a section on line 9 9 of Fig. 8. Fig. 10 is a section on line 10 10 of Fig. 8. Figs. 11 and 12 are front and side elevations of a third modification of the contact member. Fig. 13 is a vertical section of a modification of the rotary lifting member, and Fig. 14 is a similar view of another modification of the same.

In all the above views corresponding parts are represented by the same characters of reference.

The phonograph is provided with the usual bed-plate 1, on which is mounted in suitable bearings (not shown) the main shaft 2, which carries the usual mandrel and which for a part of its length is cut with a fine screw-thread to feed the reproducer lengthwise of the record. The usual stationary back rod 3 is shown, upon which is mounted the usual sleeve 4, arranged to slide on said rod and carry the reproducing device. (Not shown.) This sleeve, together with the parts usually attached thereto for supporting the reproducer, may be termed the "traveling carriage." Secured to the sleeve 4 is the usual spring-arm 5, which carries the feed nut or nuts 6 for engaging the threaded portion of the main shaft 2, and thereby imparting a progressive forward movement to the traveling carriage, as is common in this art.

In applying my improved repeating attachment to a phonograph I make use of a small compact base 7, which by means of screws 8 engaging slots 9 is removably and adjustably secured to the bed-plate 1. The base 7 is provided with two bearings 10 10, in which is mounted a return-shaft 11, having a coarse-pitch return-screw 12. The return-shaft 11 may be driven from the main shaft 2 by any approved gearing, preferably two spur-gears 13 13, mounted on the two shafts, respectively, and in engagement with each other, as shown. Secured to the sleeve 4 by a split collar 14 is an arm 15, having a bend at its center, so that it projects over in front of and substantially in line with the spring-arm 5. The arm 15 is provided with a contact member of peculiar construction, which is adapted to be engaged by a pin or projection rotating with the return-shaft 11 and lifted and brought into engagement with the return-screw 12, whereby the feed-nut will be disengaged from the feed-screw and the traveling carriage will be rapidly returned to its initial or starting position. This member in its preferred form is a dog 16,

pivotally connected to the forward end of the arm 15, so that it is capable of oscillation in two planes—one longitudinal and one transverse with respect to the axis of said return-screw shaft—that is, the axis of the first oscillation is perpendicular to the return-screw axis and the axis of the second oscillation is parallel to the return-screw axis. The range of movement on the first axis is slight and is limited for reasons which will be subsequently pointed out. These axes of oscillation are preferably secured by forming the dog with a pair of upwardly-projecting ears 17 and 18, Fig. 6, provided with openings 19 and 20, respectively, through which passes a pin 21, rigid with the arm 15. The opening 19 is slightly greater in diameter than the pin 21 and the opening 20 is considerably greater in diameter than the said pin. Furthermore, the distance between the ears 17 and 18 is considerably greater than the width of the arm 15. The result is that the dog 16 may oscillate freely upon the pin 21 as an axis, and by reason of the large opening 20 and the looseness of the pin in the opening 19 the dog may swing through a small angle upon a fore-and-aft axis—that is, one which is perpendicular to the plane of the paper upon which Fig. 6 is drawn and which is located at or near the left end of the pin 20. The dog 16 is provided with a shoulder 22, extending entirely across the same, the metal above said shoulder being cut away. A rib 23 and a tail 24 project downward from the dog 16. The rib 23 is adapted to engage the thread of the return-screw 12 and effect the return of the traveling carriage, and the tail 24 is so located as to contact with an inclined rod 25, adjustably held by a set-screw 27 in a boss 26, which projects from the plate 7 to effect the lowering of the carriage. The elevation of the traveling carriage is effected by a rotary projection, which is preferably carried by the return-screw shaft. In its preferred form a disk 28 is mounted on said shaft and may be adjusted along the thread of the screw and held by a set-screw 28^a, which presses against a block 43, occupying a groove in the bore of the disk and having a rib 43^a, which engages the thread of the screw. The disk 28 carries a pin 29, which projects toward the dog 16.

The operation of the device is as follows: When the phonograph-reproducer is in its operative position, the feed-nut 6 engages the feed-screw 2 and imparts a progressive forward movement to the traveling carriage. During this time the dog 16 hangs upon the pin 20, as shown in Fig. 3. The forward movement of the carriage causes the dog 16 to approach the lifting-pin 29 until the shoulder 22 intersects the path of the rotating pin 29. As soon as the pin reaches that portion of its path intersected by the shoulder 22 it contacts with the same, and the extent of overlap

will obviously be something less than the pitch of the feed-screw, which in commercial machines is one one-hundredth of an inch. As soon as the pin presses against the shoulder 22 it tends to turn the dog 16 upon its fore-and-aft axis. There is no tendency to lift the sound-box carrier until the limit of this range of movement is reached. It is obvious, however, that such oscillation of the dog 16 will increase the overlap of the shoulder 22 with respect to the pin 29, since the path of the shoulder is along the arc *a a* of Fig. 6. At the end of this movement a comparatively wide overlap of the contacting surfaces has been obtained, and the lifting operation begins. The dog 16 and arm 15 are lifted by the engagement of the pin 29 with the shoulder 22, and by reason of the weight of the carriage and frictional engagement of the parts the pin 29 carries the dog 16 forward until its lower surface rests upon the return-screw 12, as shown in Fig. 4. As soon as the screw revolves into the proper position the rib 23 drops into engagement with the thread of the screw, and thereby causes the sound-box carrier to be moved toward its initial position. As soon as the tail 24 reaches the inclined rod 25 the dog 16 is thrown from engagement with the return-screw, and the carriage falls into its operative position, with the feed-nut 6 in engagement with the feed-screw. The operations described may then be repeated indefinitely.

It should be noted that the thread of the return-screw pressing against the rib 23 of the dog 16 tends to turn the dog on its fore-and-aft axis; but since the range of such movement is limited the rib 23 will remain in engagement with the thread of the screw and the carriage will be moved along by the said screw. By reason of the metal above the shoulder 22 being cut away it is impossible for the face of the dog 16 to be carried against the end of the pin 29 to thereby cause the parts to jam and stop the machine.

The device of Fig. 7 is similar in all respects to the structure heretofore described, except that the dog 16 is connected to the arm 15 by means of a pin 20^a, rigid with the ears 17 and 18 and journaled in a conical bearing 30, formed in the arm 15, said bearing permitting a limited oscillation of the pin 20^a therein on a fore-and-aft axis situated near the left-hand end of the pin and perpendicular to the plane of the paper upon which Fig. 7 is drawn.

In the device of Figs. 8, 9, and 10 the dog 16 is pivotally connected to a rectangular block 31 by means of a pivot-pin 32. The block 31 is pivotally connected to the arm 15 by trunnions 33, which turn in lugs 34, depending from the end of the arm 15. The oscillation of the block 31 upon its trunnions 33 is limited by the engagement of the block 33 with the under surface of the arm 15, as

shown in Fig. 9, which shows the parts in the positions to which they will be carried by reason of the force imparted to the rib 23 by the thread of the return-screw 12.

In Figs. 11 and 12 the dog 16' is adapted to be secured to the arm 15 by a pivot-pin passing through bearings 35 35. The dog in this case is not capable of oscillation on a fore-and-aft axis. The increase of overlap is obtained, however, by substituting for the contact-shoulder 22 of the dog 16 a pawl 36, pivoted to ears 37, integral with the dog 16', by a pivot-pin 38. It should be noted that that edge of the pawl 36 which will be nearest the lifting-pin 29 is not situated directly below the center of the pin 38, but is located considerably in advance thereof. Therefore the engagement of the pin 29 with the pawl 36 will turn the same on its pivot 38 until the upper end of the pawl abuts against the side of the dog 16, thereby preventing further pivotal motion. The lifting-pin 29 will thereupon lift the dog 16' and will deposit the same upon the return-screw 12, thereby causing the return movement of the parts to take place.

It is obvious that instead of pivoting the contact-dog 16' of the traveling carriage on two axes it may be pivoted on a single axis parallel to the return-screw, as the dog 16' of Fig. 11, and the increase of overlap obtained by pivoting the lifting projection on an axis perpendicular to the axis of the return-screw, as in Figs. 13 and 14.

In Fig. 13 the disk 28', which carries the lifting-pin 29', is pivoted to a sleeve 40 by pins or trunnions 41, the axis of which is perpendicular to the axis of the return-screw 12. The sleeve 40 is secured to the screw by a set-screw 42, which bears against the block 43 and locks the same to the screw. The pin 29' is provided with a sloping surface 44, which is adapted to coöperate with a similar surface 45, formed on the shoulder 22' of the dog 16, and thereby turn the disk or ring 28' upon its trunnions 41, thereby increasing the overlap of the pin 29' with respect to the shoulder 22'.

In the device of Fig. 14 the lifting member comprises a disk 28², provided with a pawl 45, set in the body thereof, and pivoted on an axis 46, which is perpendicular to the axis of the screw 12. The pawl is normally held in the position shown by a spring 47, secured to the disk 28² by a screw 48. Obviously the pawl 45 upon striking the shoulder 22 of the dog 16, carried by the arm 15, will be turned on its pivot 46, thereby increasing the overlap of the contacting parts.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination of the traveling carriage and means for progressively moving the same when in its operative position, of a rotary lifting member, and a

contact member carried by said carriage for engaging the lifting member, said contact member being capable of oscillation on a universal joint, substantially as set forth.

5 2. In a phonograph, the combination of the traveling carriage and means for progressively moving the same when in its operative position, of a rotary lifting member, and a
10 contact member carried by said carriage for engaging the lifting member, said contact member being capable of oscillation on two axes, one of which is substantially perpendicular to the axis of rotation of the lifting member and the other of which is substantially
15 parallel thereto, substantially as set forth.

3. In a phonograph, the combination of the traveling carriage, and means for progressively moving the same when in its operative position, of a rotary lifting member for effecting the elevation of said carriage, and a contact member traveling with said carriage toward said lifting member, said contact member being capable of oscillation on two axes substantially at right angles to each other,
25 substantially as set forth.

4. In a phonograph, the combination of the traveling carriage and means for progressively moving the same when in its operative position, of a lifting member for effecting the elevation of said carriage, and a contact member traveling with said carriage toward said lifting member, one of said members being mounted to turn on two axes which are substantially at right angles to each other, and
30 the other member being mounted to turn on an axis substantially parallel to one of said first axes, substantially as set forth.

5. In a phonograph, the combination of the traveling carriage and means for progressively moving the same when in its operative position, of the return-screw and lifting member carried thereby for effecting the elevation of said carriage, and a contact member traveling with said carriage toward said lifting member, one of said members being mounted to turn on two axes which are substantially at right angles to each other and the other member being mounted to turn on an axis substantially parallel to one of said first axes,
45 substantially as set forth.

6. In a phonograph, the combination of the traveling carriage and means for progressively moving the same when in its operative position, of the return-screw and lifting member carried thereby and adjustable along the thread thereof for effecting the elevation of said carriage, and a contact member traveling with said carriage toward said lifting member, one of said members being mounted
55 to turn on two axes which are substantially

at right angles to each other and the other member being mounted to turn on an axis substantially parallel to one of said first axes, substantially as set forth.

7. In a phonograph, the combination with 65 the traveling carriage and means for progressively moving the same when in its operative position, of an arm extending from said carriage and provided with a pivot-pin the axis of which is parallel to the direction of movement of the carriage, and a contact-dog provided with upwardly-extending ears loosely fitting on said pin, the bearing-aperture of one of the ears being considerably greater than the diameter of the pin, whereby the dog is 75 capable of a limited oscillation on an axis at right angles to the axis of the pin, substantially as set forth.

8. In a phonograph, the combination with the traveling carriage and means for progressively moving the same when in its operative position, of a contact member carried by said carriage and capable of oscillation on two axes at substantially right angles to each other, said contact member being provided with a 85 shoulder projecting in the direction of travel of said carriage, the material above said shoulder being cut away, substantially as set forth.

9. In a phonograph, the combination with 90 the traveling carriage and means for progressively moving the same when in its operative position, of a rotary lifting member for effecting the elevation of said carriage and a contact member traveling with said carriage toward said lifting member, said contact member being capable of oscillation on two axes substantially at right angles to each other, and said lifting member being adjustable toward and away from said contact member, 100 substantially as set forth.

10. In a phonograph, the combination with the traveling carriage and means for progressively moving the same when in its operative position, of a return-screw and projection carried thereby for effecting the elevation of said carriage, said projection being adjustable along the line of the thread of said return-screw, and a contact member traveling with said carriage toward said lifting member, said 110 contact member being capable of oscillation on two axes substantially at right angles to each other, substantially as set forth.

This specification signed and witnessed this 30th day of October, 1905.

EDWARD L. AIKEN.

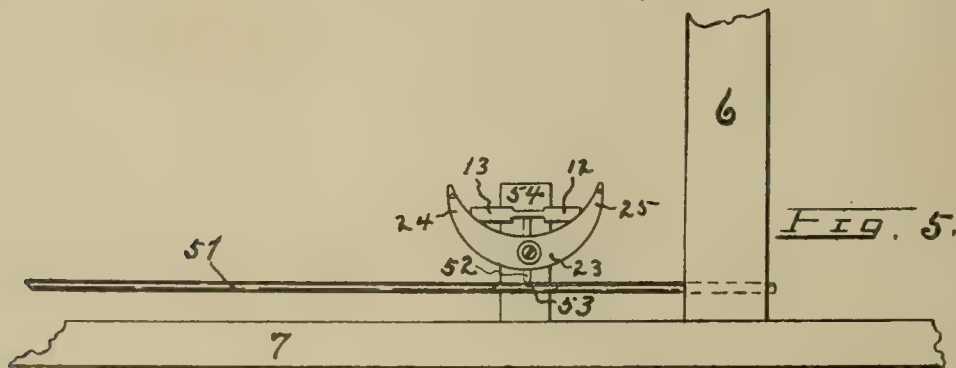
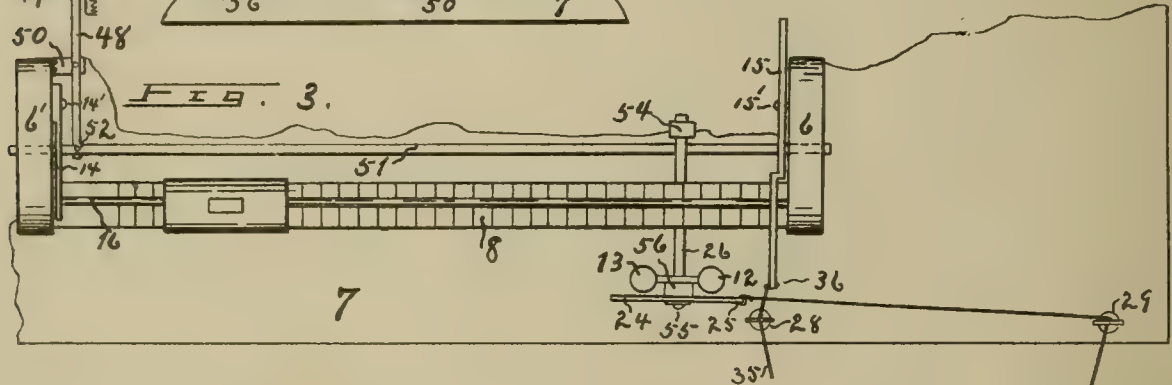
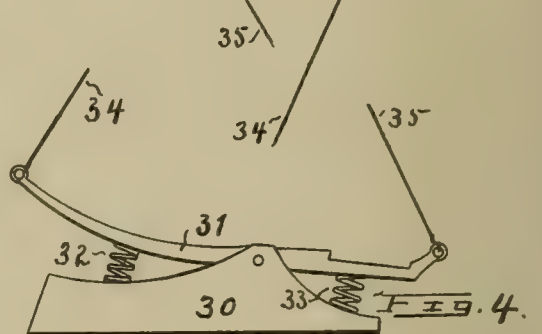
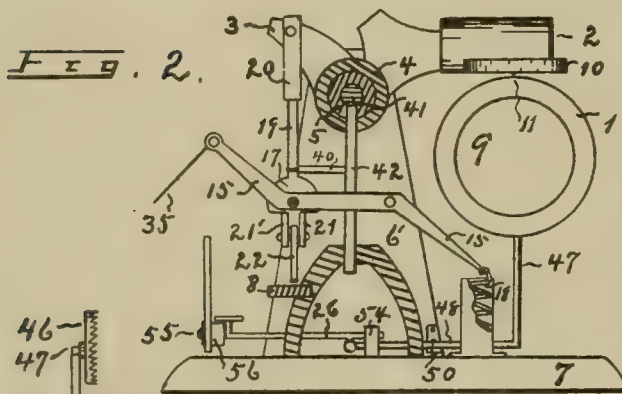
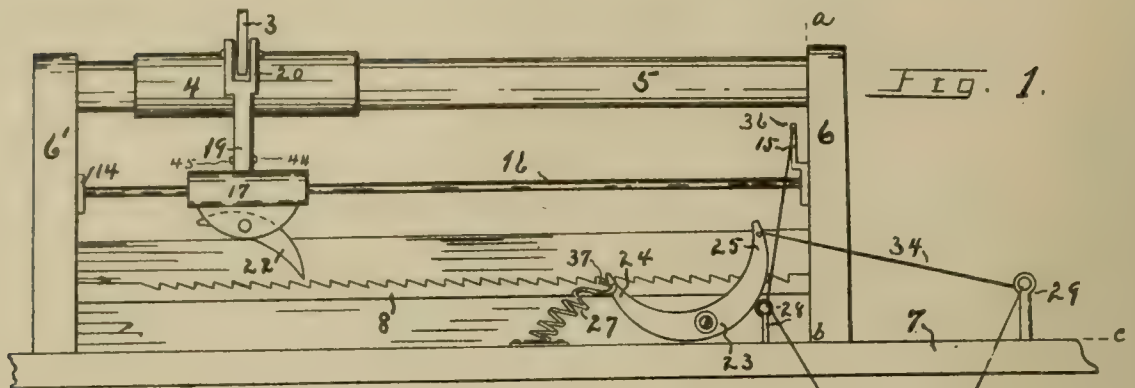
Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

No. 820,642

PATENTED MAY 15, 1906.

M. J. & J. GREEVY.
GRAPHOPHONE ATTACHMENT.
APPLICATION FILED AUG. 7, 1905.



Witnesses

B. R. Ball.
L. A. Broadwell.

By

Matthew J. Greevy and
Jules Greevy
Hiram A. Sturges Attorney

UNITED STATES PATENT OFFICE.

MATTHEW J. GREEVY AND JULES GREEVY, OF OMAHA, NEBRASKA.

GRAPHOPHONE ATTACHMENT.

No. 820,642.

Specification of Letters Patent.

Patented May 15, 1906.

Application filed August 7, 1905. Serial No. 273,065.

To all whom it may concern:

Be it known that we, MATTHEW J. GREEVY and JULES GREEVY, citizens of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Graphophone Attachments, of which the following is a specification.

This invention relates to improvements in graphophone attachments, and particularly to a means for controlling the movement of the record and producer.

The object of the invention is to provide a means whereby the operator of a type-writing machine may by use of the foot or knee cause the commencing or ceasing movement of the record-cylinder and reproducer of a graphophone or may produce "repeating" movement of the graphophone without use of the hands.

In the combined use of the graphophone and type-writer the messages of the record-cylinder are communicated to the operator of the type-writer by means of a rubber hearing-tube provided with earpieces which extend to the graphophone, the latter being, of course, a separate machine. The operator by moving a lever upon the graphophone causes the record-cylinder to revolve and after listening often is obliged to reverse the lever to cause cessation of the message or on account of speed differences or words not being distinctly heard or understood finds it necessary to reverse said lever. There is a loss of time, therefore, while turning from one machine to the other. The hands of the operator should not be removed from the keyboard to perform satisfactory type-writing, and the interruption to control the start and stop and repeating movement of a separate machine with the hands is a great annoyance, as is well known.

Our invention is designed to overcome these difficulties by the use of novel means fully described herein and illustrated by the drawings, wherein—

Figure 1 represents a vertical front elevation of the invention to show relative position of parts and manner of mounting the slidable sleeve, the link, pawl, pawl-rack, elbow-lever, and the connecting flexible cords or members. Fig. 2 represents a vertical end view showing a record-cylinder, reproducer, and rock-shaft of a graphophone and the relative position of a part of the devices employed, as levers, rods, pawl, and pawl-

rack, all more fully explained hereinafter, the figure being shown on the lines *a b c* of Fig. 1. Fig. 3 represents a top view of a part of the invention to illustrate mounting of guide-rod, sleeve, arms 14 and 15, and to show form of pawl-rack, also to plainly indicate the relative position of rock-shaft 26 and the mounting thereon of arms 24 and 25. Fig. 4 represents the treadle-frame, treadle, and arrangement of parts. Fig. 5 represents a vertical front elevation of a part of the invention to more clearly show the relative position of parts.

In the drawings the numeral 1 represents the record-cylinder, 2 the reproducer, 3 the reproducer-handle, 4 the reproducer-guide, 5 the reproducer slide-rod, 41 the actuating worm-cylinder, 42 the vertical alining-bar, 26 the rock-shaft, 12 the start-lever, 13 the stop-lever, and 6 and 6' the vertical standards of the framework, of a graphophone now in common use, the parts being sustained upon the platform 7. The construction and operation of these parts are so well known that they require no particular description, and it is sufficient to say the record-cylinder is slidably and removably mounted upon the mandrel 9, is provided with a finely and spirally grooved longitudinal periphery, and has a revolving movement upon the mandrel, the latter being rotated by means of mechanism contained within the machine.

A stationary rod 5 is sustained between the standards 6 and 6' of the frame. The reproducer 2 is provided with a disk 10, beneath which is the reproducer-point 11, which travels within the grooves of the record-cylinder, already mentioned.

A forward movement of the reproducer in a direction toward standard 6 upon guide 4 upon the rod 5 is caused by rotation of the worm-cylinder 41 within rod 5 by means of a motor contained within the graphophone, the speed corresponding with the revolving movement of the mandrel 9, the vertical alinement of the guide 4 upon the rod 5 being preserved by the vertical bar 42, which travels with the guide 4. This movement continues upon the slide-rod 5 parallel with the record-cylinder until the spiral groove upon the latter has been fully traversed.

For the purposes of this description the conventional rock-shaft of a graphophone is indicated by the numeral 26, the start-lever by the numeral 12, and the stop-lever by 13.

When the operator presses upon start-lever 12, the revolving movement of the record-cylinder commences and an audible message may be received and will continue until the stop-lever 13 has been pressed, or, in effect, until rock-shaft 26 has been reversed. When it is desired to have a message repeated, the operator presses the stop-lever 13, after which the reproducer-handle 3 has to be moved in order to cause the raising of the reproducer 2 with disk 10, and the point 11 is caused to retrace the groove by sliding the guide 4 toward the standard 6' and lowering the reproducer 2 until the point 11 contacts with the record-cylinder.

For the purposes of the invention we construct a stationary pawl-rack 8 of suitable width, attached to and sustained by and between the vertical standards 6 and 6'. This trackway is provided with teeth equally spaced apart, transversely disposed to the trackway, and inclinedly set, the vertical walls of the teeth being upon the side facing the direction from which the reproducer approaches, and upon the inner walls of standards 6 and 6' we mount the arms 14 and 15 by means of the pivots 14' and 15', these arms extending to the front of the machine on a plane lower than the reproducer-rod 5, and we rigidly mount upon the arms 14 and 15 the slide-rod 16. The arm 15 is extended in a lateral direction, as shown in Figs. 2 and 3, to form a lever, which is attached to the spring 18, mounted upon the platform 7, and as thus constructed the slide-rod 16 is parallel with the reproducer slide-rod 5 and with the pawl-rack 8 and is adapted to have a free swinging movement upon the arms 14 and 15 under control of spring 18. Upon the slide-rod 16 we mount the sleeve 17, adapted to slide thereon. The sleeve 17 has an integral portion extending from its center upward to form the link 19, its upper end terminating in the clevis 20, pivotally mounted upon the reproducer-handle 3, and upon the arms 21 and 21' of the sleeve 17 we pivotally mount the pawl 22, adapted to engage the teeth of the pawl-rack 8 under control of means hereinafter described.

We provide the elbow-lever 23, (best shown in Fig. 1,) having the arms 24 and 25, and mount it rigidly upon the end of rock-shaft 26 of a graphophone in a manner so that arm 25 of the elbow-lever may be used in the place of the start-lever 12 of a graphophone, and the arm 24 of said elbow-lever will correspond to the stop-lever, and since the elbow-lever is rigidly mounted upon the end of the rock-shaft the well-known movement of the latter may be controlled by actuating the arms 24 and 25, as is evident. For the purpose of operating arms 24 and 25, as well as other parts of our invention, we employ a suitable spring 27 upon platform 7, attached to arm 24. We construct eye-stands 28 and 29, rigidly po-

sitioned at convenient stations upon the graphophone, and preferably upon the floor we place a treadle-frame 30 and foot-treadle 31, pivotally mounted thereon, and employ the springs 32 and 33, so that the treadle will be resiliently mounted at either end, and at the toe end of the treadle we attach a flexible member—as, for instance, a cord 34—which extends in any convenient manner to pass to the lever end 25 of elbow-lever 23, to which the cord is attached, first passing through eye-stand 29 to give it convenient direction, and to the heel end of the treadle we attach cord 35, which extends to the eye 36 of the extended lever-arm 15, to which the cord 35 is attached after passing through the eye-stand 28 to conveniently control direction of the cord.

It will be understood that the revoluble movement of the record-cylinder 1 in almost all graphophones now in use is controlled by a clutch, which has a lateral "on-and-off" contact upon the end of the record-cylinder. This clutch is wholly under control of rock-shaft 26, and in Fig. 3 we show the clutch 46, which is sustained rigidly upon the upper end of the vertically-disposed arm 47, Figs. 2 and 3. Arm 47 is constructed integral with the horizontal lever 48, disposed transversely thereon, and is adapted to have a slight lateral swing by reason of the pivotal mounting of lever 48 at 50. One end of lever 48 is pivotally mounted upon lever 51 at 52, the last-named lever extending parallel with pawl-rack 8 and having suitable bearings in standards 6 and 6', Figs. 3 and 5. Upon rock-shaft 26 is provided rigidly and transversely thereon the index 52, the free end of which enters the groove 53, incised upon the surface of lever 51. One end of rock-shaft 26 has a bearing or support within the stationary block 54, Figs. 2, 3, and 5. Lever 23 is rigidly mounted upon rock-shaft 26, as by means of the screw 55 and block 56, Figs. 2 and 3. The lever 51 is adapted to have a lengthwise movement under operation of index 52 of the rock-shaft, thereby operating the clutch.

As thus constructed and arranged our invention provides means so that the operator of a type-writer has full control of the graphophone without use of the hands, and for the purpose of causing a message to be repeated the provisions made are as follows: The pawl 22 is mounted inclinedly upon its pivotal support and travels with the sleeve 17 upon a horizontal plane above the teeth, but closely adjacent thereto while in its normal position; but when cord 35 is drawn in a direction toward the treadle the arms 14 and 15 are moved in a downward sweep, and with these arms are carried the reproducer-handle 3, the link 19, sleeve 17, slide-rod 16, and pawl 22, thereby causing the pawl to engage one of the teeth of the pawl-rack 8. Since the pawl-

rack is stationary, the pawl is made to move in the arc of a circle, the extent of such arc being the distance from its pivotal bearing to the horizontal plane of the teeth, the center of the arc being the point of contact of the lower end of the pawl with the tooth of the pawl-rack, and as the pressure comes downward the sleeve is moved backward or in the direction of standard 6', as is evident, carrying with it the reproducer, and this is the operation of repeating. A pressure downward of the heel end of the treadle instantly causes the "stop" action of the graphophone, as well as the action of repeating, one action being sufficient for both purposes. When the toe end of the treadle is pressed, the cord 34 is drawn, which causes the lever end 25 to be moved in a direction toward standard 6, which causes the record-cylinder to commence revolution, as is obvious.

Springs 32 and 33 are adapted to have equal tension, and a positive movement of the foot is required to change the normal position of the treadle and effect a control of the graphophone. The resiliency of spring 27 is adapted to be greater than the combined resilient force of all other springs plus friction, and therefore the normal position of lever 23 is always "stop" until a pressure is made upon the toe end of the treadle.

When the graphophone is use separately for dictation purposes, the lever 23 is released from operation of spring 27 by means of the hook upon the end of said spring.

From the description given the operation of the invention will be readily understood. When the lever-arm 24 is under control of spring 27 by means of the hook 37, a downward toe-pressure by the operator causes the "start" movement of the record-cylinder, and upon removal of the toe-pressure the treadle returns to a normal position, and movement of the record-cylinder ceases by reason of the resilient force of spring 27, and a pressure of the heel causes a "repeated" message, as already described.

In order that the alinement of the sleeve 17 with slide-rod 16 may be preserved, so that no binding or dragging movement may occur of these parts while the sliding movement is performed, the horizontally-mounted arm 40 is employed. This arm 40 is made integral with the alining-bar 42 and is provided with a yoke consisting of the arms 44 and 45, which come upon either side of link 19.

Various changes in detail of construction may be made without departing from the spirit of the invention. We have shown but one of several methods of controlling the handle of the reproducer and of the start and stop lever considered the best, and we do not limit ourselves to exactness of construction, the scope of the invention being governed by the claims, and it is evident that an oscillat-

ing knee-lever may be substituted for the foot-treadle provided with U-formed hooks suitably mounted or a foot-loop substituted for the treadle, and the control of these movements of the graphophone would be equally operative.

What we claim as our invention is—

1. In a graphophone attachment, the combination with a reproducer of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link, a stationary rack engaged by said pawl; mechanism adapted to control said pawl, and means to control said mechanism.

2. In a graphophone attachment, the combination with the reproducer of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link; a stationary rack engaged by said pawl; a slide-rod adapted to control said pawl; mechanism adapted to control said slide-rod; and means to control said mechanism.

3. In a graphophone attachment, the combination with a reproducer of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link; a stationary rack engaged by said pawl, a slide-rod adapted to control said pawl; pivotally-mounted arms adapted to control said slide-rod; mechanism adapted to control said pivotally-mounted arms, and means to control said mechanism.

4. In an attachment of the class described, the combination with a reproducer of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link; a stationary rack engaged by said pawl, a slide-rod adapted to control said pawl, pivotally-mounted arms adapted to control said slide-rod; a flexible member adapted to control said pivotally-mounted arms, and means to control said flexible member.

5. In an attachment of the class described, in combination with the reproducer and the vertical alining-bar of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link, a stationary rack engaged by said pawl; mechanism adapted to control said pawl; means to control said mechanism; a horizontally-disposed alining-bar mounted upon said vertical alining-bar, and making contact with said link.

6. In an attachment of the class described, in combination with the reproducer and the vertical alining-bar of a graphophone, of a link adapted to control said reproducer; a pawl adapted to control said link; a stationary rack engaged by said pawl, a slide-rod adapted to control said pawl; mechanism adapted to control said slide-rod; means to control said mechanism; a horizontally-disposed alining-bar mounted upon said vertical alining-bar, and making contact with said link.

7. In an attachment of the class described,
in combination with the reproducer and the
vertical alining-bar of a graphophone; of a
link adapted to control said reproducer; a
5 pawl adapted to control said link; a station-
ary rack engaged by said pawl; a slide-bar
adapted to control said pawl; pivotally-
mounted arms adapted to control said slide-
rod; a flexible member adapted to control
10 said pivotally-mounted arms; means to con-
trol said flexible member; a horizontally-dis-

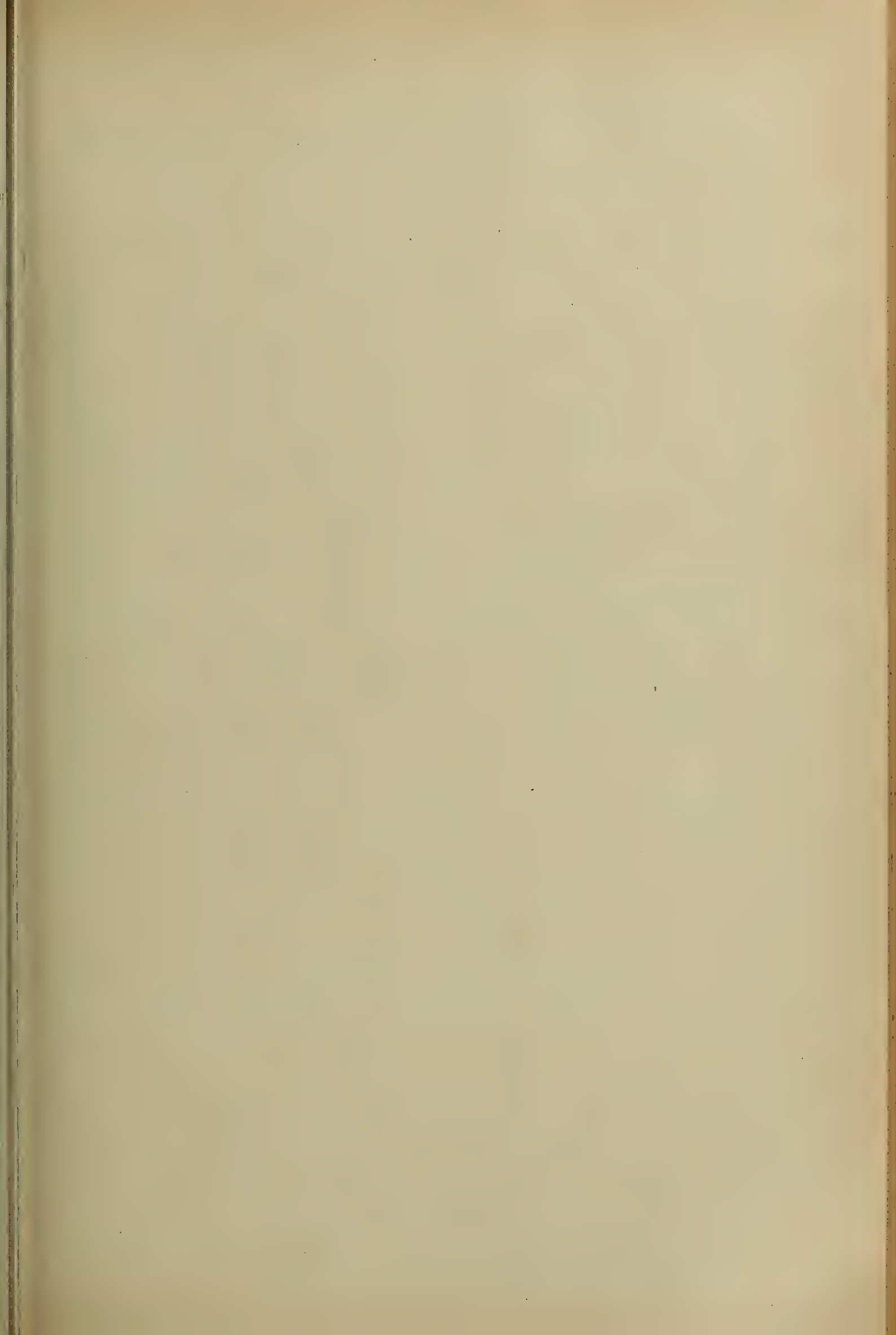
posed alining-bar mounted upon said vertical
alining-bar, and making contact with said
link.

In testimony whereof we affix our signa- 15
tures in presence of two witnesses.

MATTHEW J. GREEVY.
JULES GREEVY.

Witnesses:

S. A. BROADWELL,
H. A. STURGES.



No. 820,926.

PATENTED MAY 15, 1906.

R. HEAD.
SOUND REPRODUCER.
APPLICATION FILED APR. 25, 1905.

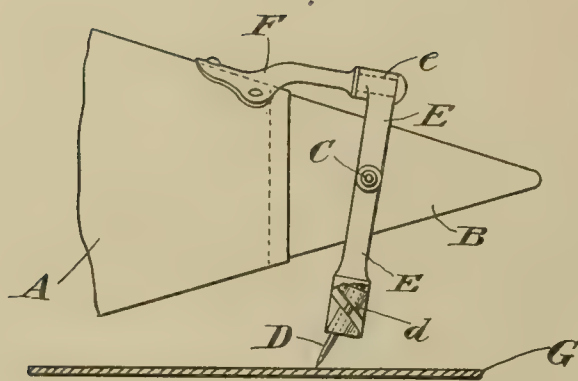


Fig. 1

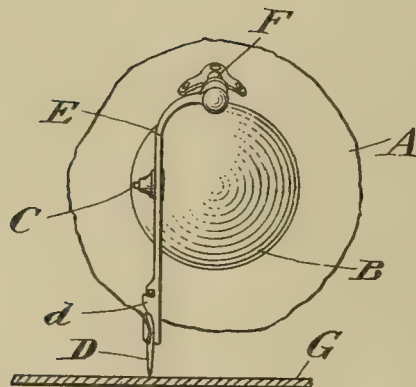


Fig. 2.

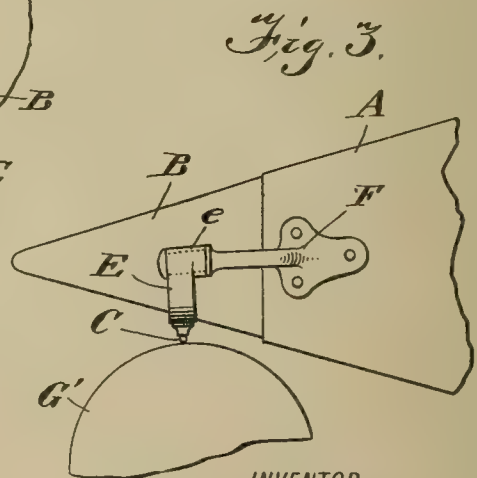


Fig. 3.

WITNESSES:

Edwin Walker
V. E. Nichols

INVENTOR
Robert Head,

BY *Griffin & Bernhard*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT HEAD, OF NEW YORK, N. Y., ASSIGNOR TO EDWIN WALKER, OF
ERIE, PENNSYLVANIA.

SOUND-REPRODUCER.

No. 820,926.

Specification of Letters Patent.

Patented May 15, 1906.

Original application filed May 18, 1904, Serial No. 208,539. Divided and this application filed April 25, 1905. Serial No. 257,305.

To all whom it may concern:

Be it known that I, ROBERT HEAD, a citizen of the United States, residing at New York, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a specification.

My invention is a reproducer for phonographs and talking-machines generally, and it is a division of a prior application for Letters Patent of the United States filed by me on May 18, 1904, Serial No. 208,539.

The object of the invention is the provision of a reproducer which may be used interchangeably in connection either with a graphophone-record or a gramophone-record.

Broadly stated, my invention consists of a sound-reproducer provided with a plurality of styluses, one of which is adapted for use on a graphophone-record and another is adapted to be used in connection with a gramophone-record. In other words, the styluses of my reproducer may be used on records having curvilinear surfaces and plane surfaces regardless of the movement which may be given to the record—that is to say, the different styluses are capable of use on records which are distinguished by vertical and lateral undulations.

Reference is to be had to the accompanying drawings, forming a part of this specification, wherein like characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a sound-reproducer embodying my invention and adapted for use in connection with a graphophone-record or a gramophone-record, a part of the reproducer being broken away. Fig. 2 is a view in rear elevation of the reproducer shown by Fig. 1, illustrating one of the styluses in coöperative relation to a gramophone-record. Fig. 3 is another view in side elevation, showing the reproducer adjusted to bring the other stylus into coöperative engagement with a graphophone-record.

A designates a reproducer, which is shown by the drawings as a horn having a vibratory member or diaphragm which is adapted to be actuated by either of a plurality of styluses. As shown, the reproducer A has a sound-box B, which is conical in shape and is closed at its apex. This conical sound-box

may be made of any suitable or appropriate material, and it is adapted to have vibrations imparted thereto by the coöperation of a stylus with a sound-record.

C D designate a plurality of styluses adapted for coöperation with curvilinear and plane records, respectively. These styluses may be connected in any way with the diaphragm or sound-box of the sound-reproducer; but, as shown, I employ an arm or member E as the means for operatively connecting the two styluses to the reproducer. The arm has a pivotal connection at *e* with a bracket F, the latter being attached fixedly to the reproducer A, whereby the arm is adapted to have movement with relation to said reproducer. The arm is attached or connected in any appropriate way at a point intermediate of its length to the diaphragm B, and said arm is shown as extending beyond a side of the reproducer in order that it may present the stylus D to a gramophone-record, (indicated at G in the drawings.)

The styluses C D may be of any suitable or appropriate material—as, for instance, metal, glass, or any other preferred substance. The stylus C is attached to or mounted on the arm E in a suitable way—as, for example, by cementing, riveting, or otherwise fastening said stylus directly to the arm at a point intermediate of its length. The other stylus D is shown in the form of a pin, which is mounted in a stylus-holder *d*, the latter being provided at the free end of the arm E. The stylus-holder may be of any suitable or appropriate construction which will enable the stylus D to be secured firmly and detachably in or to the arm E. The stylus C extends from the arm E in a different direction from the stylus D, and in one embodiment of the invention the two styluses are connected to the arm so as to lie at right angles one to the other, although this special organization of styluses is not material.

The reproducer A may be adjusted in position to present either of the styluses to the sound-record. As shown by Figs. 1 and 2, the reproducer occupies a position wherein the arm E is substantially vertical, and the stylus D is adapted to coöperate with a gramophone-record G. The reproducer may, however, be adjusted bodily to move the arm E to a substantially horizontal position, as indicated by Fig. 3, thereby bringing the stylus

C into coöperative relation to a curvilinear record II, such as a graphophone-record.

It will be understood that my invention is not restricted to the particular type of reproducer herein disclosed and that the gist of the invention consists of a reproducer having a plurality of styluses which are adapted for use in connection with a record having vertical undulations or a record having lateral undulations, such as graphophone and gramophone records, respectively.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is —

1. A phonograph - reproducer provided with a plurality of styluses arranged and adapted for use respectively in connection with graphophone and gramophone records.

2. A phonograph - reproducer provided with two styluses, one being arranged for use in connection with a graphophone-record, and the other with a gramophone-record.

3. A phonograph-reproducer having a stylus adapted for use on a graphophone-record, and also provided with a stylus arranged to operate on a gramophone-record; said styluses being in different planes and adapted to be brought, by a change in the position of the

reproducer, into coöperative relation to one of the specified types of records.

4. A phonograph - reproducer provided with two styluses; said reproducer being rotatable whereby one stylus may be brought into coöperative relation to a graphophone-record, and the other into like relation to a gramophone-record.

5. A phonograph - reproducer having a member provided with a stylus adapted to coöperate with a graphophone-record, and provided also with a stylus adapted to coöperate with a gramophone-record.

6. A phonograph - reproducer provided with a plurality of reproducing-styluses, one or more of the stylus-points being in a different plane from the others, said reproducer being capable of being positioned to place either of said styluses into coöperative relation to a record.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT HEAD.

Witnesses:

H. I. BERNHARD,
V. E. NICHOLS.

No. 821,045.

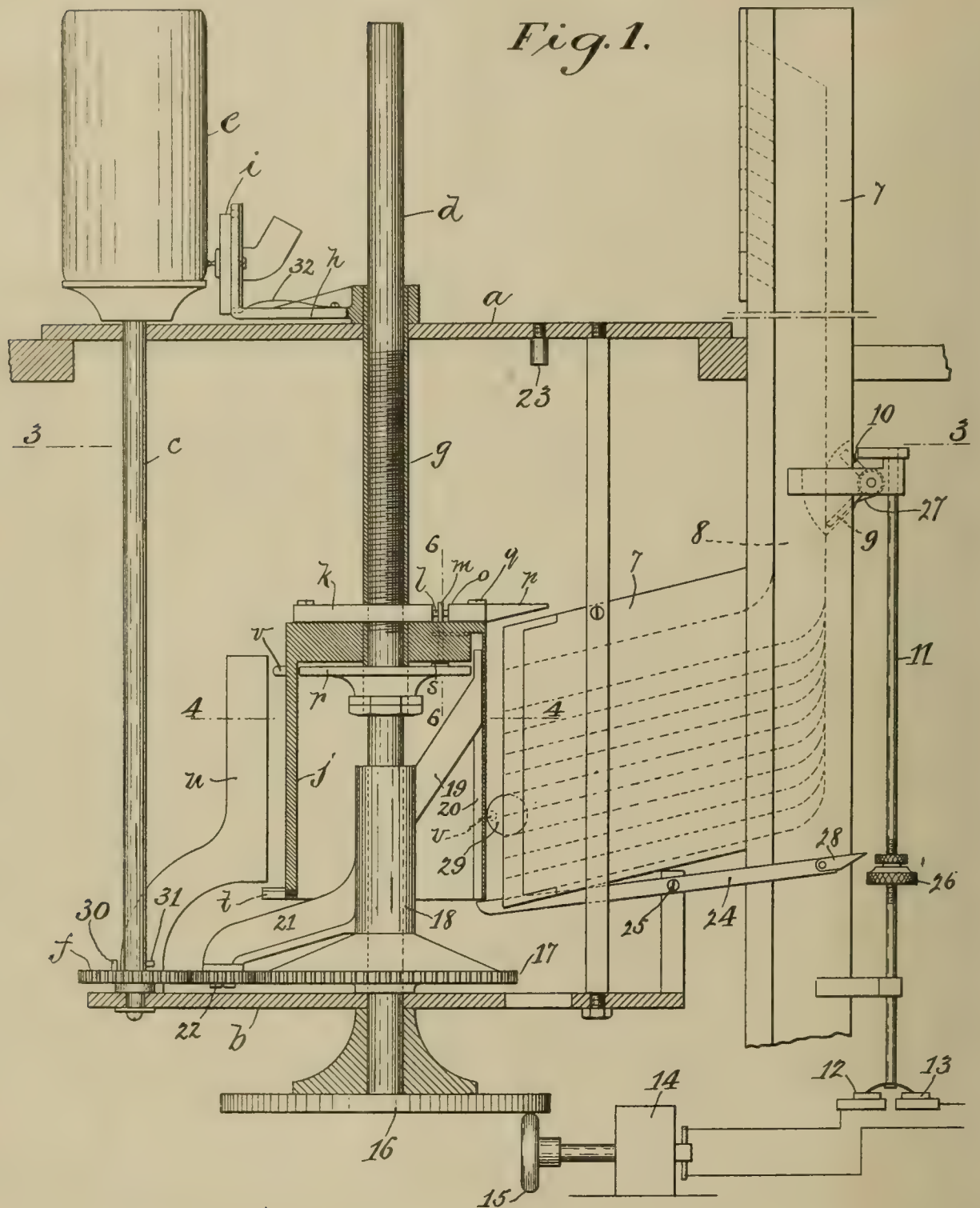
PATENTED MAY 22, 1906.

E. LESCHBRANDT.
TALKING MACHINE.

APPLICATION FILED MAR. 14, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

H. H. Canby
Henry Canby

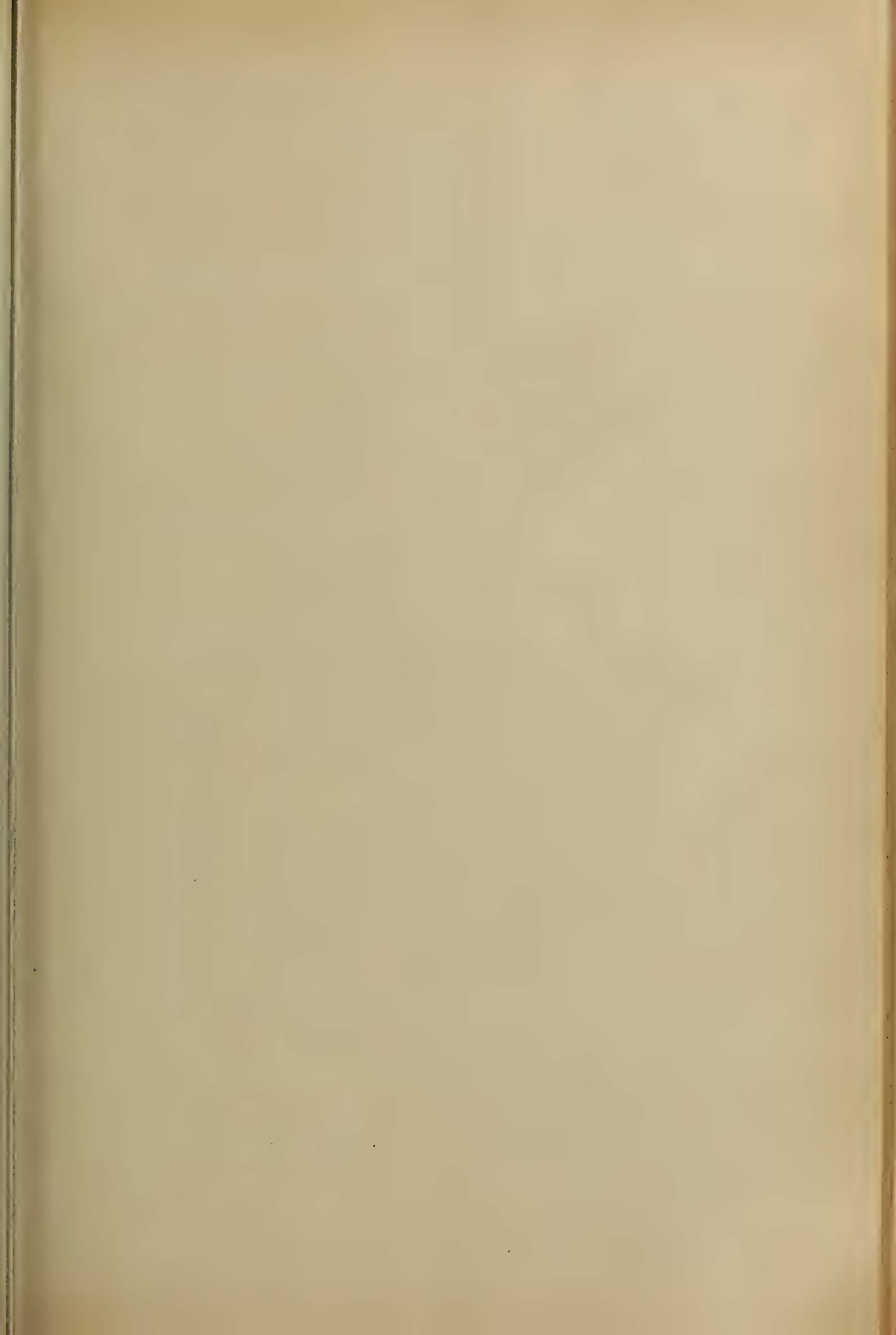
INVENTOR

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E. LESCHBRANDT.
TALKING MACHINE.
APPLICATION FILED MAR. 14, 1905.

3 SHEETS—SHEET 2.

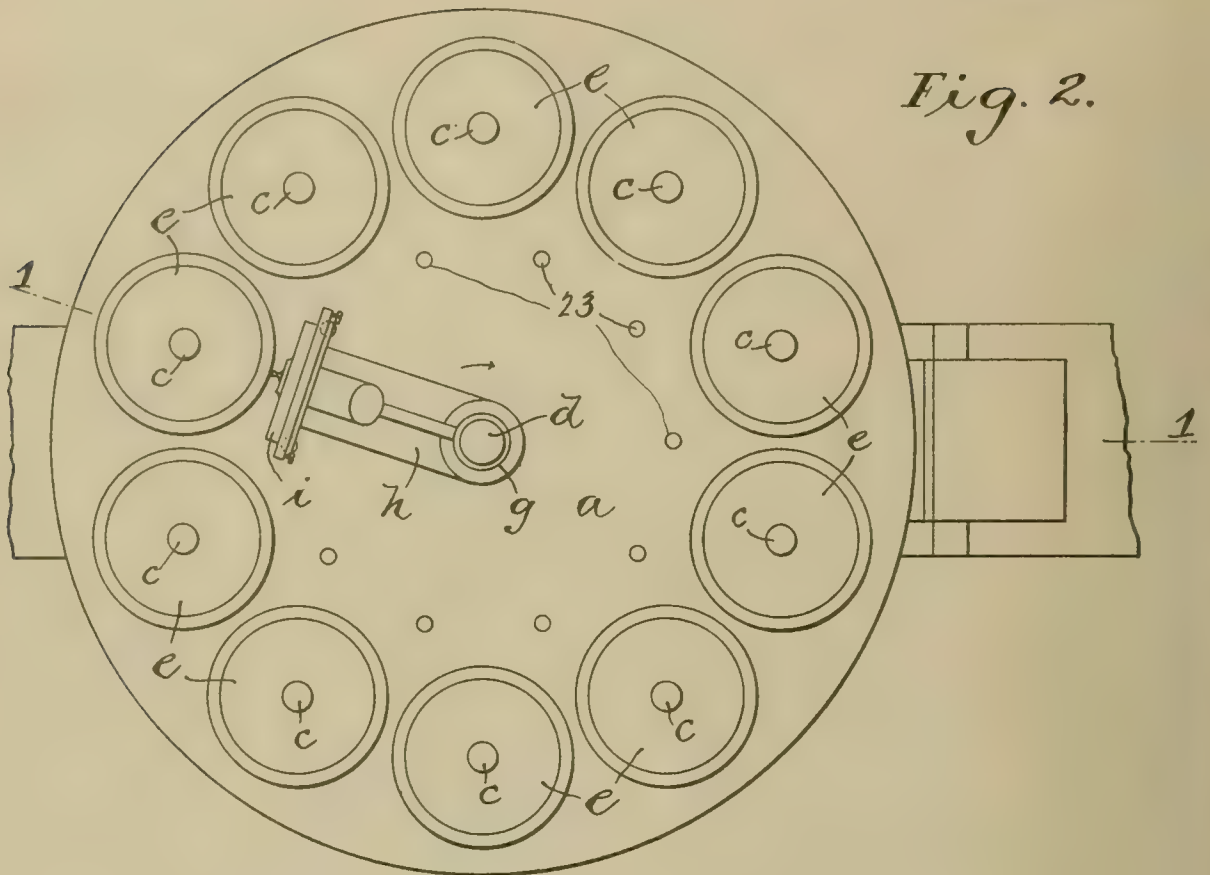


Fig. 2.

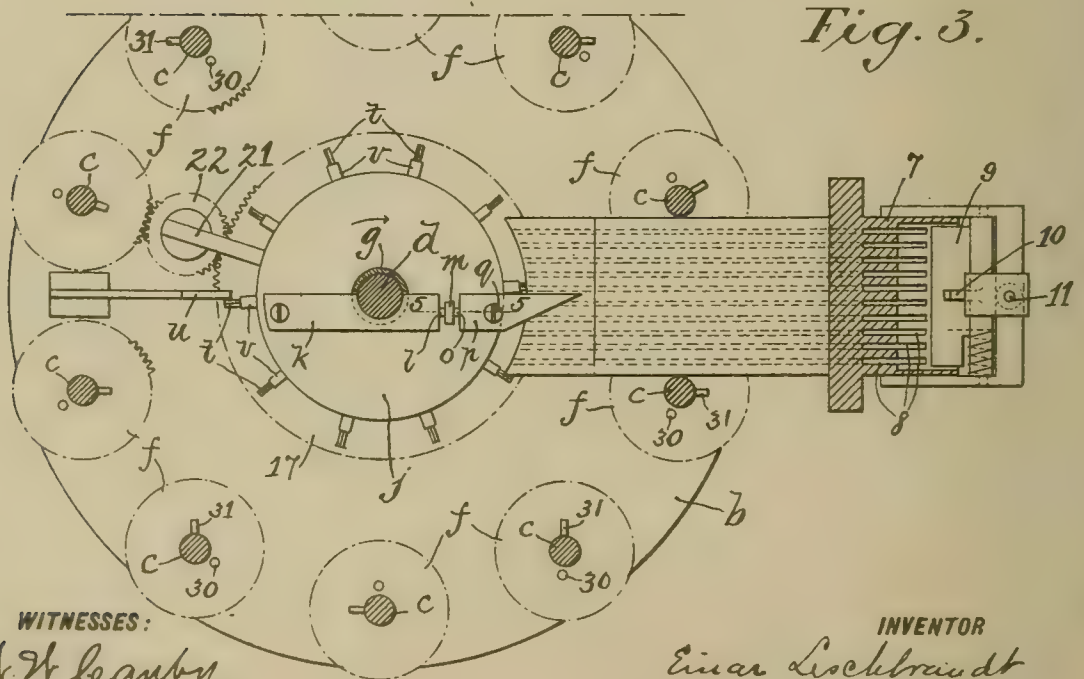


Fig. 3.

WITNESSES:

H. H. Leamy.
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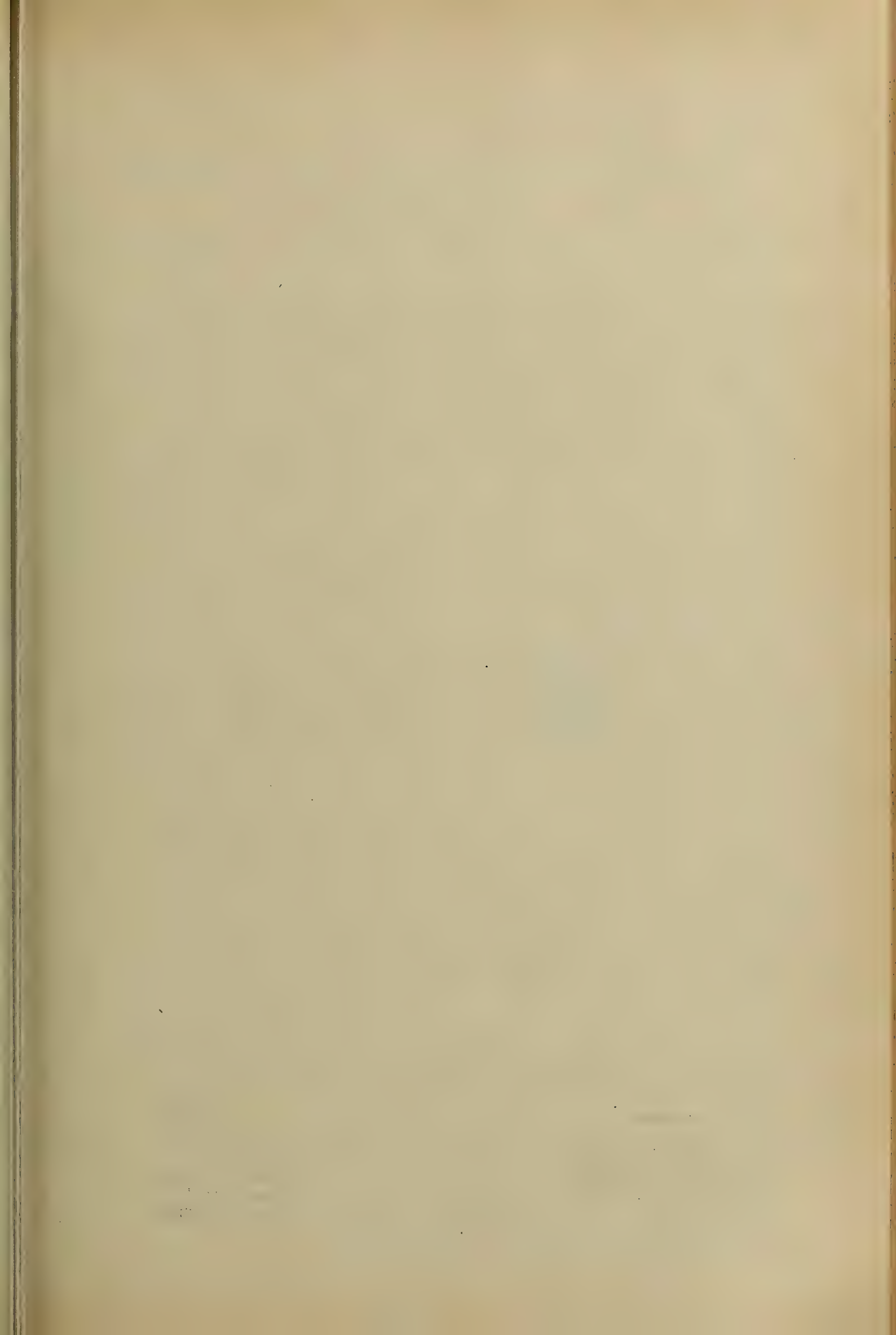
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No. 821,045.

PATENTED MAY 22, 1906.

E. LESCHBRANDT.
TALKING MACHINE.

APPLICATION FILED MAR. 14, 1906.

3 SHEETS—SHEET 3.

Fig. 4.

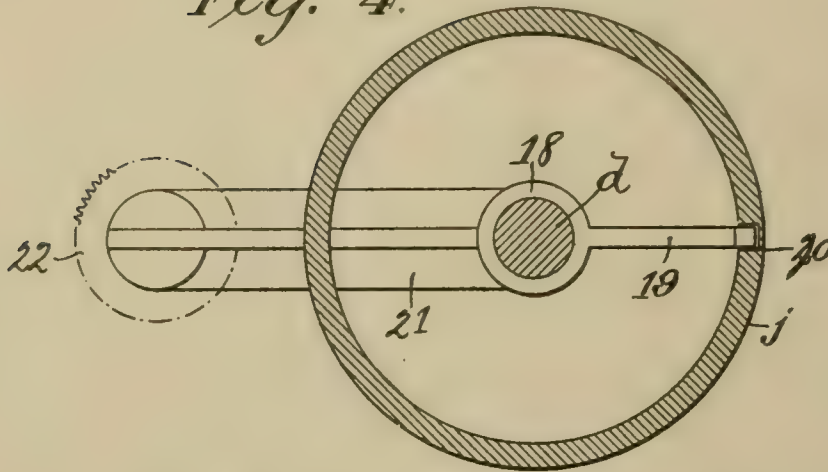


Fig. 5.

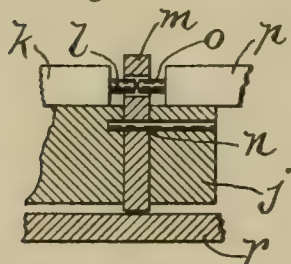


Fig. 6.

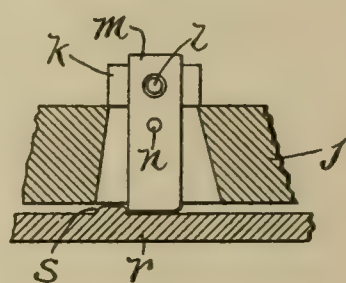
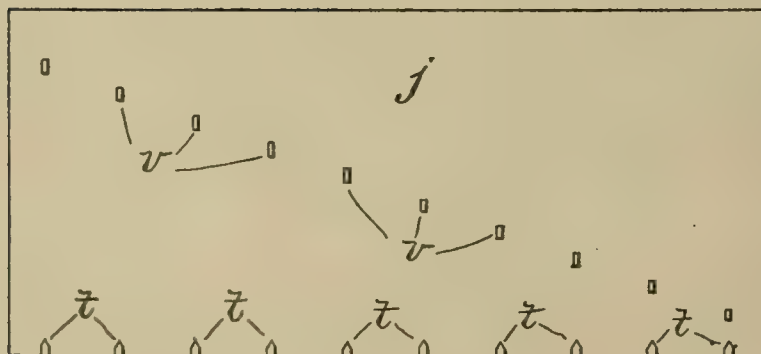


Fig. 7.



WITNESSES:

W. H. Leamy,
Craig & Leamy

INVENTOR

Einar Leschbrandt

BY

Chas. A. Patten,
ATTORNEY.

UNITED STATES PATENT OFFICE.

EINAR LESCHBRANDT, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

No. 821,045.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed March 14, 1905. Serial No. 249,975.

To all whom it may concern:

Be it known that I, EINAR LESCHBRANDT, a subject of the King of Sweden and Norway, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking-machines; and the object of my invention is to furnish an improvement in coin-operated multiplex talking-machines, as more fully set forth hereinafter.

In the accompanying drawings, forming part of this specification, and in which similar characters of reference indicate similar parts throughout the several views, Figure 1 is a side elevation, partly in central sectional elevation, of a multiplex talking-machine embodying my improvements; Fig. 2, a plan of Fig. 1; Fig. 3, a section of Fig. 1 on line 3 3; Fig. 4, a section of the cup *j* on line 4 4; Fig. 5, a section of Fig. 2 on line 5 5; Fig. 6, a section of Fig. 1 on line 6 6; Fig. 7, an expanded view or development of the cylinder *j*.

a is an upper, and *b* a lower, plate which form part of the frame of the machine. These plates are stationary and are carried in any suitable manner. *c* designates spindles, in the present case ten, which are arranged concentrically around the central shaft *d*. At their upper ends the spindles carry each a record *e* and at their lower ends each a gear-wheel *f*. The spindles *c* are supported in suitable bearings in the plates *a b*.

The central shaft *d* is surrounded for part of its length by a sleeve *g*, the upper end of this sleeve carrying an arm *h*, which carries a sound-box *i*, which may be of usual construction. The lower end of the sleeve is attached to a cup *j*, which is closed at its upper and open at its lower end. Carried by the upper end of cup *j* is a pivoted arm *k*, one side of which is grooved and threaded, so as to form a nut which will partly surround and engage the thread cut on the shaft *d*. At its outer or free end the arm *k* carries a pin *l*, (best shown in Fig. 5,) which passes about half-way through a trigger *m*, which is carried upon a pivot *n*, carried by the top of cup *j*.

o is a pin in line with pin *l* and also passing about half-way through trigger *m*. The pin *o* is carried by the inner end of an arm *p*, which is pivoted at *q* to the top of cup *j*.

r is a plate fast to shaft *d* and so located that when the cup *j* is in its lowest position it

engages or almost engages the under side of the top of the cup.

s is a stop carried by plate *r*, which is adapted to engage the bottom of trigger *m*, as and for a purpose to be presently described.

t designates stops projecting out from the lower end of cup *j*, adapted to engage a standard *u*.

v designates pins projecting out from the sides of cup *j*, adapted to engage a coin to arrest a rotary movement of said cup at a particular point.

There are as many stops *t* and as many pins *v* as there are records carried by the machine, and these stops and pins are so placed upon the cup that they each correspond to one of the records—that is, one stop and one pin each represents one particular record.

7 is a coin-chute which is provided with as many coin-passages 8 as there are records carried by the machine.

9 is an arm of a bell-crank lever which extends across all of the coin-passages 8. 10 is the other arm of this lever, which normally is adapted to engage and hold in a raised position a rod 11, which is adapted when lowered to close or join the contact-points 12 13 on a line-wire to energize a motor 14, which drives a friction-wheel 15, which drives a friction-wheel 16, which is fast to and drives the shaft *d*.

Normally the entire machine is at rest and the rod 11 is raised and no current is passing from point 13 to point 12. If now a coin be dropped into one of the coin-chutes, it will on its descent engage the arm 9 of the bell-crank, lowering this arm and arm 10, so that the rod 11 will be dropped, connecting the points 13 12 and permitting a current to pass to start the motor 14, which through wheels 15 16 will drive shaft *d*. In the meantime the coin will have run down its passage and will have engaged the side of the cup *j*, as shown in Fig. 1.

The motor 14 having been started, the shaft *d* commences to revolve and carries around with it the cup *j* until the pin *v*, that corresponds with the coin-passage 8, that contains the coin 29, engages the coin, which is held in place partly by the passage 8 and partly by the periphery of the cup *j*. As soon as the pin engages the coin the revolution of the cup *j* ceases, but the shaft *d* continues to revolve, carrying around with it the plate *r*, the stop *s*, which will presently engage the trigger *m*, which will move the nut-forming arm *k* into engagement with the

threads on shaft *d*. As soon as this engagement takes place the cup *j*, being held from turning, commences to rise, and presently and before the pin *v* leaves the coin 29 the stop *t*, which corresponds to the pin *v* and to one particular record, will engage the standard *u*, which will prevent a rotary movement of the cup *j* so long as the stop *t* is in contact with it.

When the rotary movement of the cup *j* is arrested by the pin *v* and coin 29, the sound-producer *i* will be in position to engage the particular record *e* corresponding to the passage 8 in which the coin has been placed, and the vertical movement of the cup *j* will, through sleeve *g*, cause the reproducer to be moved laterally of the record.

As the cup *j* is revolved it carries around with it the arm 19 of the sleeve 18, the outer end of this arm engaging a slot 20, formed vertically on the inside of the cup. This arm and sleeve in turning carry around with them the arm 21, also carried by the sleeve. On the arm 21 is a gear-wheel 22, which meshes with and is driven by the gear-wheel 17, fast on shaft *d*. The arm 21 is directly under the arm *h*, which carries the sound-producer *i*, and hence when the cup *j* is stopped rotating by the pin *v* and the coin the gear-wheel 22 is in engagement with the gear-wheel *f*, that is upon the spindle *c*, that carries the record that the sound-reproducer is in engagement with, the movement of the gear-wheel 17 being transmitted through gear 22 to gear *f* to drive the spindle and the record.

It will be understood that the vertical movements of the sound-box and the rotary movement of the record are properly timed to secure the proper reproduction of the latter by the former.

The cup *j* rises until the stop *t* is raised above the top of standard *u*, and as soon as this occurs, the stop being released, the cup will revolve with the shaft until presently the outer end of arm *p* will strike a stop 23, carried by top plate *a*. This will cause the inner end of arm *p* to move outward, tripping trigger *m* and at the same time moving the arm or nut *k* out of contact with the screw on shaft *d*. There being nothing now to support the cup *j*, it will fall by gravity, the plate *r* forming an air-cushion to prevent a too rapid fall to its lowest position. On its way down the cup will engage the inner end of a lever 24, which is pivoted at 25, and the outer end of this lever, which engages a button 26 on rod 11, will raise this rod, breaking the electrical connection at 12 13 and stopping the motor. When the rod 11 is raised, the arm 10 of the bell-crank lever will be moved by a spring 27 under the top of the rod, which will be thus held in its raised position until the passage of a coin, which will drop the rod 11, as before described, causing its lower end to close the

contacts 12 13, which will establish the electric circuit and again start motor 14.

The gear-wheel 22, carried by arm 21, upon being swung around from its starting-point to its final position of engagement with the gear that is to rotate the spindle carrying the record to be reproduced will engage and partly rotate the several gear-wheels *f* that it will pass in its swinging movement. In order that this may be done with the least expenditure of power, the gear-wheels *f* are loose on the spindles *c* and are furnished with pins 30, which are adapted to engage pins 31, carried by the spindles *c*, in order to drive the spindles when the gears *f* are constantly driven by the gear 22.

In order to be self-adjusting, the sound-reproducer *i* is not rigidly secured to the arm *h*, but is loosely held by this arm to the arm which carries a spring 32, upon which the reproducer *i* rests.

The coin-operated means for operating the electric switch which controls the movements of the motor which drives the central shaft, the record-carrying spindles, &c., is not claimed herein. It will form the subject of a separate application for patent.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a talking-machine, in combination, a multiplicity of record-supports placed concentrically around a central shaft, said shaft, a sound-reproducer guided by and capable of a movement of rotation around and a longitudinal movement along said shaft, means for bringing said sound-reproducer into coöperative relation with any predetermined one of the records carried by said record-supports, means for rotating said shaft, means actuated by said shaft for advancing said sound-reproducer longitudinally of said record-support, and means for rotating said record-support upon its longitudinal axis.

2. In a talking-machine, in combination, a multiplicity of vertically-arranged cylindrical record-supports placed concentrically around a central vertical shaft, said shaft, a sound-reproducer capable of a movement of rotation around and a lateral movement upon said shaft, means for bringing said sound-reproducer into coöperative relation with a record carried by any predetermined one of said record-supports, means actuated by said shaft for advancing said sound-reproducer vertically in contact with a record carried by one of said supports, means for rotating said record-supports around their vertical axis, and means for rotating said central shaft.

3. In a talking-machine, in combination, a central vertical threaded shaft, a multiplicity of record-supports surrounding said shaft, a sound-reproducer carried by a sleeve surrounding said shaft, means for rotating said shaft, means for rotating said record-sup-

ports, means for bringing said sound-reproducer into coöperative relation with a record carried by any one of said record-supports, and means operated by the screw-thread on
5 said central shaft for advancing said sound-reproducer longitudinally in contact with a record carried by one of said supports.

4. In a talking-machine, in combination, a central vertical threaded shaft, a multiplicity
10 of vertical record-spindles surrounding said shaft, a cup closed at its upper end surrounding said central shaft, a sleeve carried by said cup and surrounding said shaft, an arm carried by said sleeve, a sound-reproducer carried by said arm, means for locking said cup
15 to the thread on said central shaft, means for preventing a rotary movement of said cup while the sound-reproducer is in operative connection with one of the records carried by
20 said spindles, means for rotating said central shaft and means for rotating the record-carrying spindles.

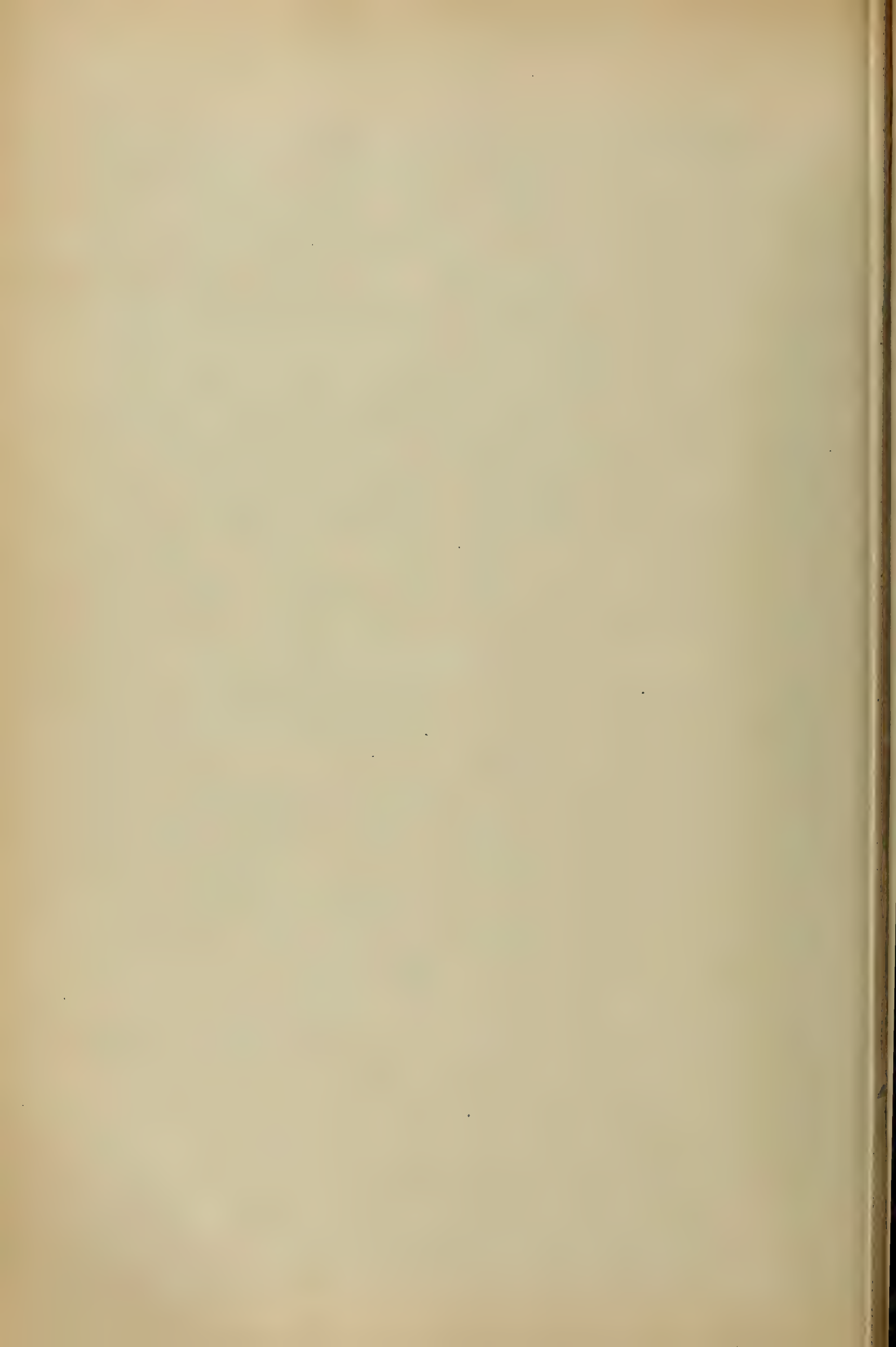
5. In a talking-machine, in combination, a

central threaded shaft, means for driving said shaft, an inverted cup surrounding said shaft, 25 a sound-reproducer carried by said cup, means for carrying and means for rotating a record, a swinging nut carried by said cup, a trigger connected with said nut, a pivoted arm connected with said trigger, a plate carried by said shaft, a stop carried by said plate 30 adapted upon the revolution of said shaft and plate to engage said trigger to cause said nut to engage the thread on said shaft, means for preventing said cup from turning when said 35 sound-reproducer is in contact with a record, and means for tripping said pivoted arm, trigger and swinging nut so as to throw the latter out of engagement with the threads of the central shaft when the sound-reproducer 40 has traversed a record.

EINAR LESCHBRANDT.

Witnesses:

GEORGE W. SELTZER,
CHARLES A. RUTTER.



No. 821,071.

PATENTED MAY 22, 1906.

P. WEBER.
PHONOGRAPH.

APPLICATION FILED OCT. 21, 1905.

Fig. 1

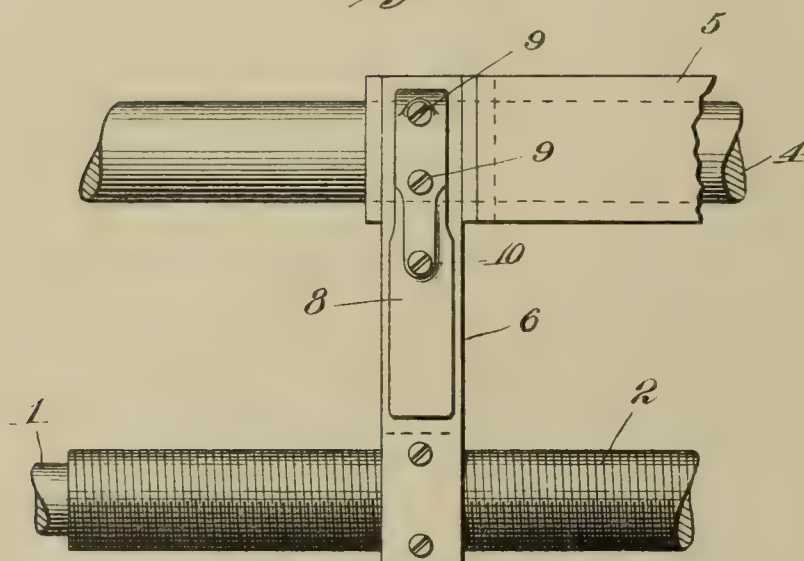
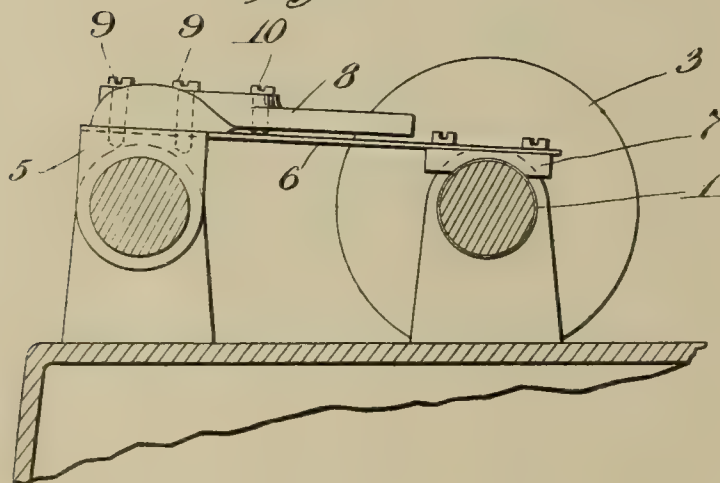


Fig. 2



Attest:

Edgar W. Greene
Delos Holden

Inventor:

Peter Weber
by *Frank L. Soper* Att'y.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 821,071.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed October 21, 1905. Serial No. 283,837.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and has for its object the provision of means for protecting and adjusting the spring used for carrying the feed-nut by which the traveling carriage is given a progressive movement. In phonographs of the Edison type this spring is secured at its rear end to the carriage and extends forwardly therefrom, and it frequently happens that persons who are ignorant of the proper manipulation of the machine make use of the said spring for raising the carriage when it is desired to change the record on the mandrel. In this way the spring frequently becomes bent so that it does not properly hold the feed-nut upon the feed-screw. It is desirable, therefore, that means be provided for preventing such injury even though the spring be used for this purpose. It is also desirable that means be provided for adjusting the free end of the said spring in a downward direction, so that any desired pressure of the feed-nut upon the screw may be obtained. With these ends in view my invention consists in the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawings, in which—

Figure 1 is a plan view illustrating an embodiment of my invention; and Fig. 2 is a side elevation, partly in section, of the same.

Corresponding parts are designated by the same numerals of reference in both views.

In the drawings, 1 represents the main shaft of a phonograph, which is provided with a feed-screw 2 of narrow pitch and carries the usual mandrel 3 for supporting the record.

4 is the usual back rod, upon which the traveling carriage or support 5 is sleeved and to which the rear end of the feed-nut spring 6 is secured. This spring carries at its free end the feed-nut 7, which normally engages the feed-screw 2. A guard 8 is situated above the spring 6 and extends close to said spring at its free end, so that if the spring is used for raising the carriage a slight bending

of the same will cause it to press against the end of the guard, which then carries the weight of the parts and prevents further bending of the spring, or, in other words, it greatly shortens the leverage exerted on the spring by the weight of the parts.

The guard 8 and spring 6 are preferably secured to the carriage 5 by screws 9 9, which pass through the guard and spring and are threaded in the said carriage.

In order that the free end of the spring 6 may be adjusted downwardly, an adjusting-screw 10 is threaded in the guard 8, passing through the same and abutting against the top of said spring, as shown in Fig. 2. Obviously a downward movement of this screw will increase the pressure of the feed-nut upon the screw 2.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination of the feed-screw, back rod and support traveling on said back rod, of the feed-nut spring secured at one end to said support, and a rigid guard carried by said support and extending close to said spring at its free end, substantially as set forth.

2. In a phonograph, the combination of the feed-screw, back rod, and support traveling on said back rod, of the feed-nut spring secured at one end to said support, a rigid guard carried by said support and extending close to said spring at its free end, and a device coöperating with said guard for adjusting the free end of said spring downward, substantially as set forth.

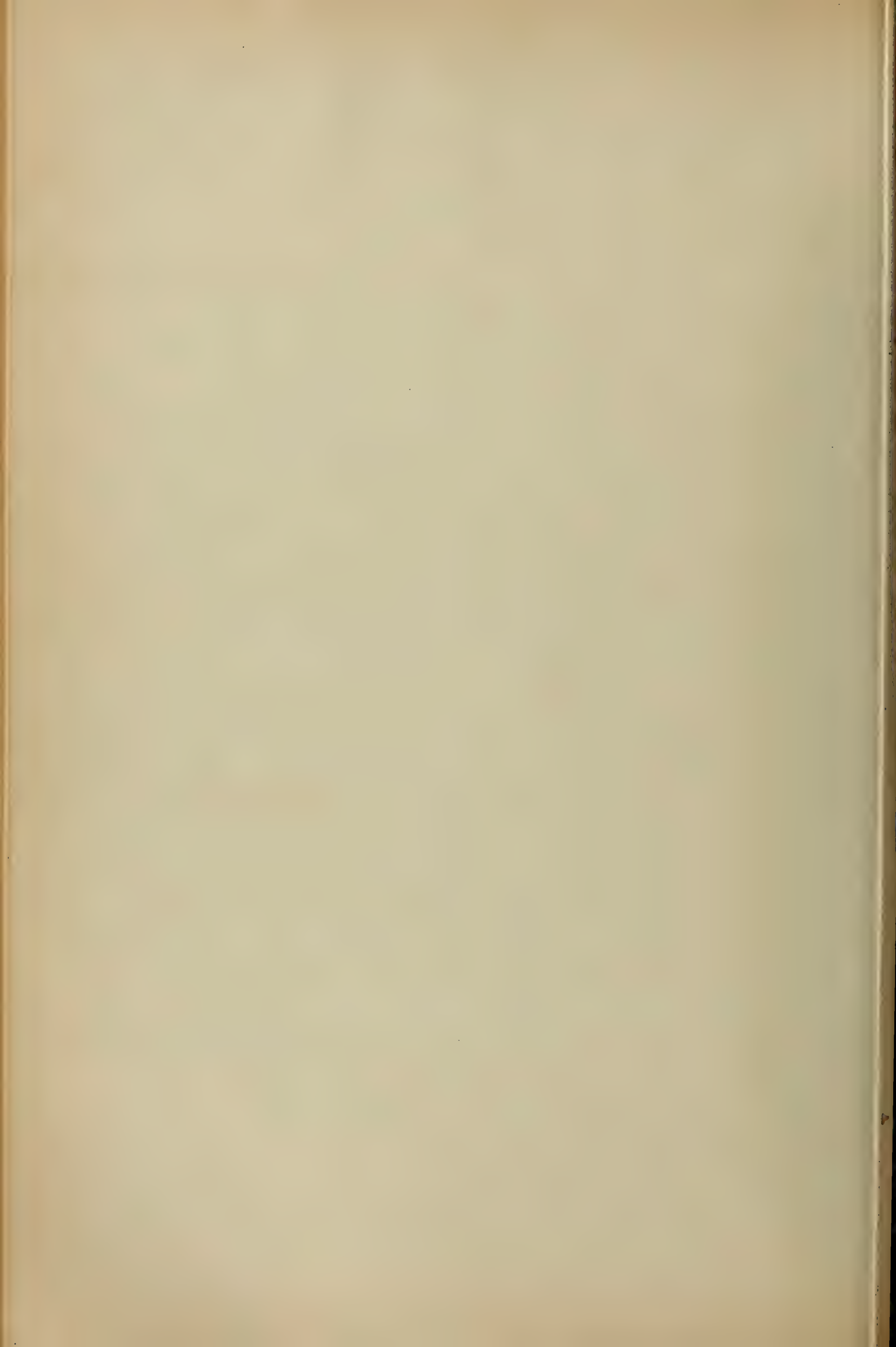
3. In a phonograph, the combination of the feed-screw, back rod, and support traveling on said back rod, of the feed-nut spring secured at one end to said support, a rigid guard carried by said support and extending close to said spring at its free end and an adjusting-screw threaded in said guard and abutting against said spring, substantially as set forth.

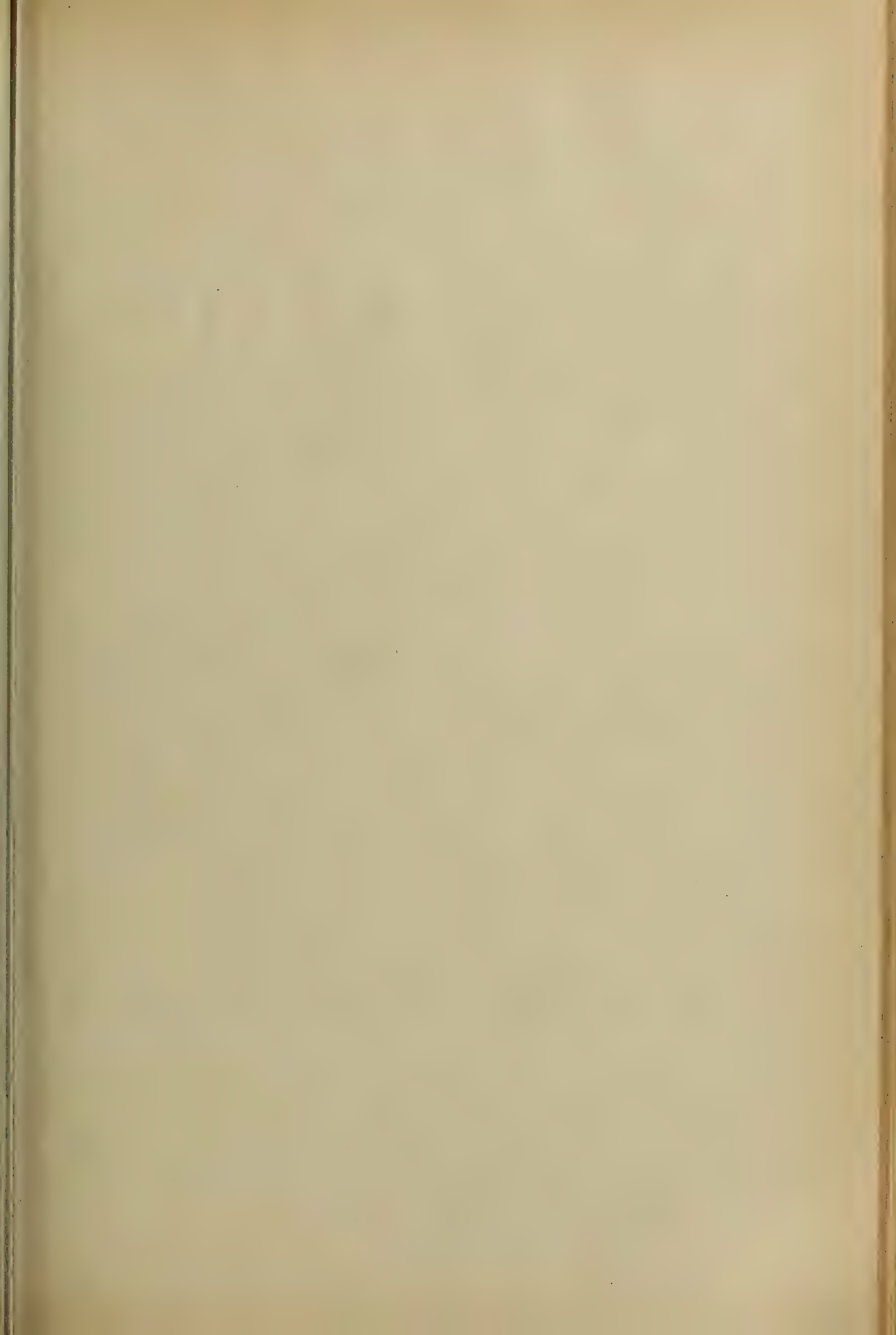
This specification signed and witnessed this 19th day of October, 1905.

PETER WEBER.

Witnesses:

FRANK L. DYER,
DELOS HOLDEN.



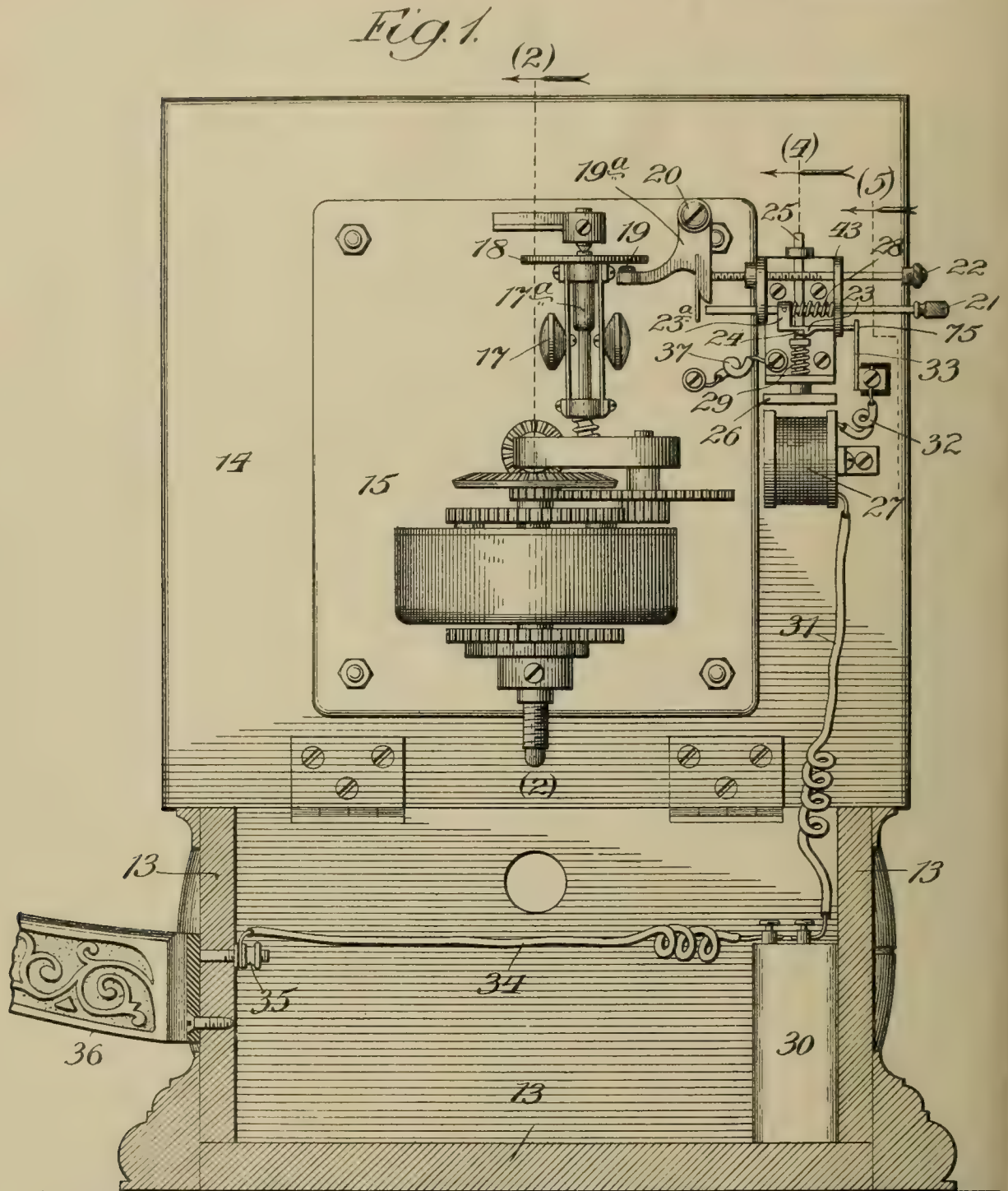


J. EIFEL.

AUTOMATIC CUT-OFF FOR SOUND REPRODUCING MACHINES.

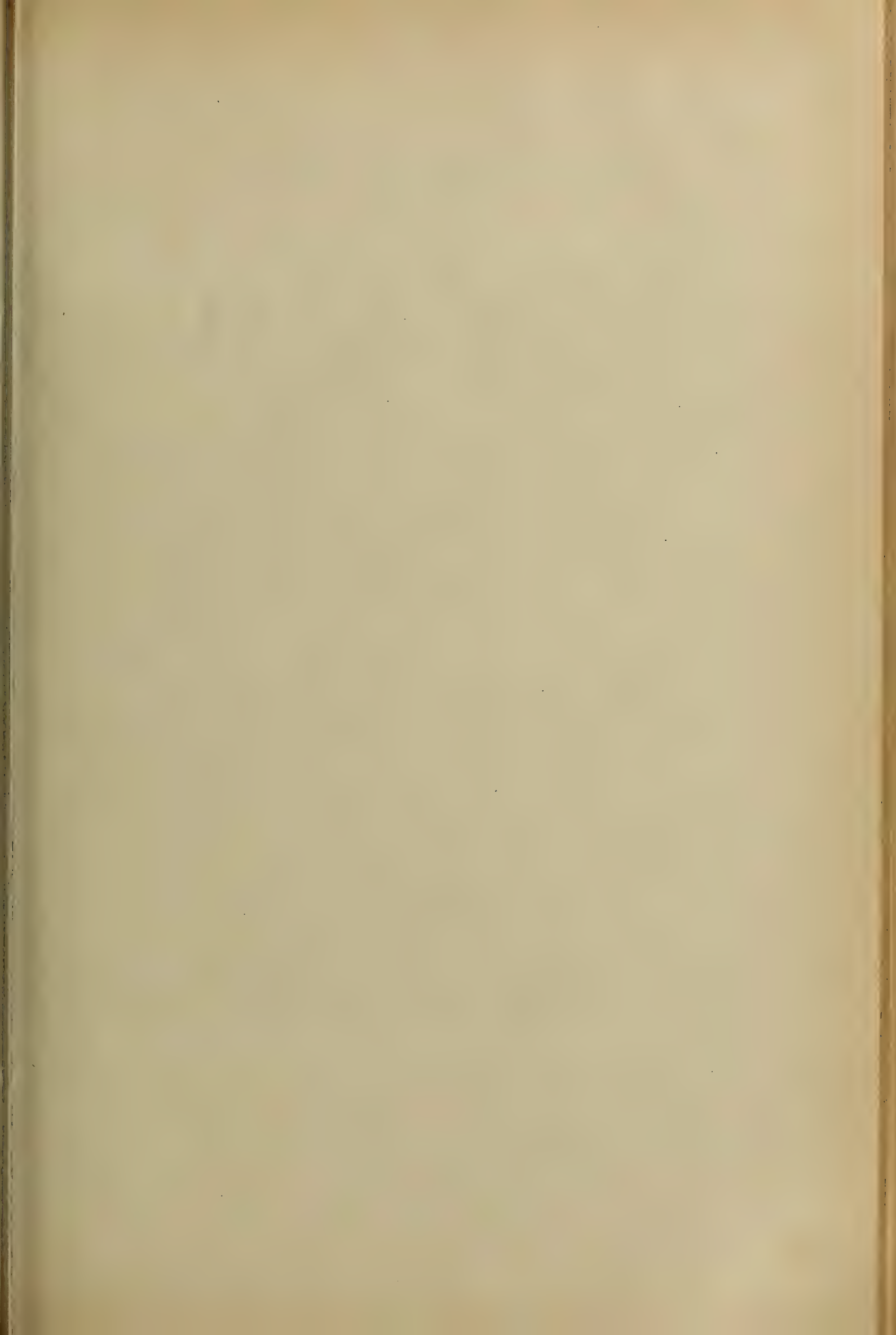
APPLICATION FILED JUNE 13, 1904.

3 SHEETS—SHEET 1.



Witnesses:
 Chas. H. Eberk
 Hermann Lechner

Inventor:
 Joseph Eifel,
 By Paul Symmestredt
 Attorney

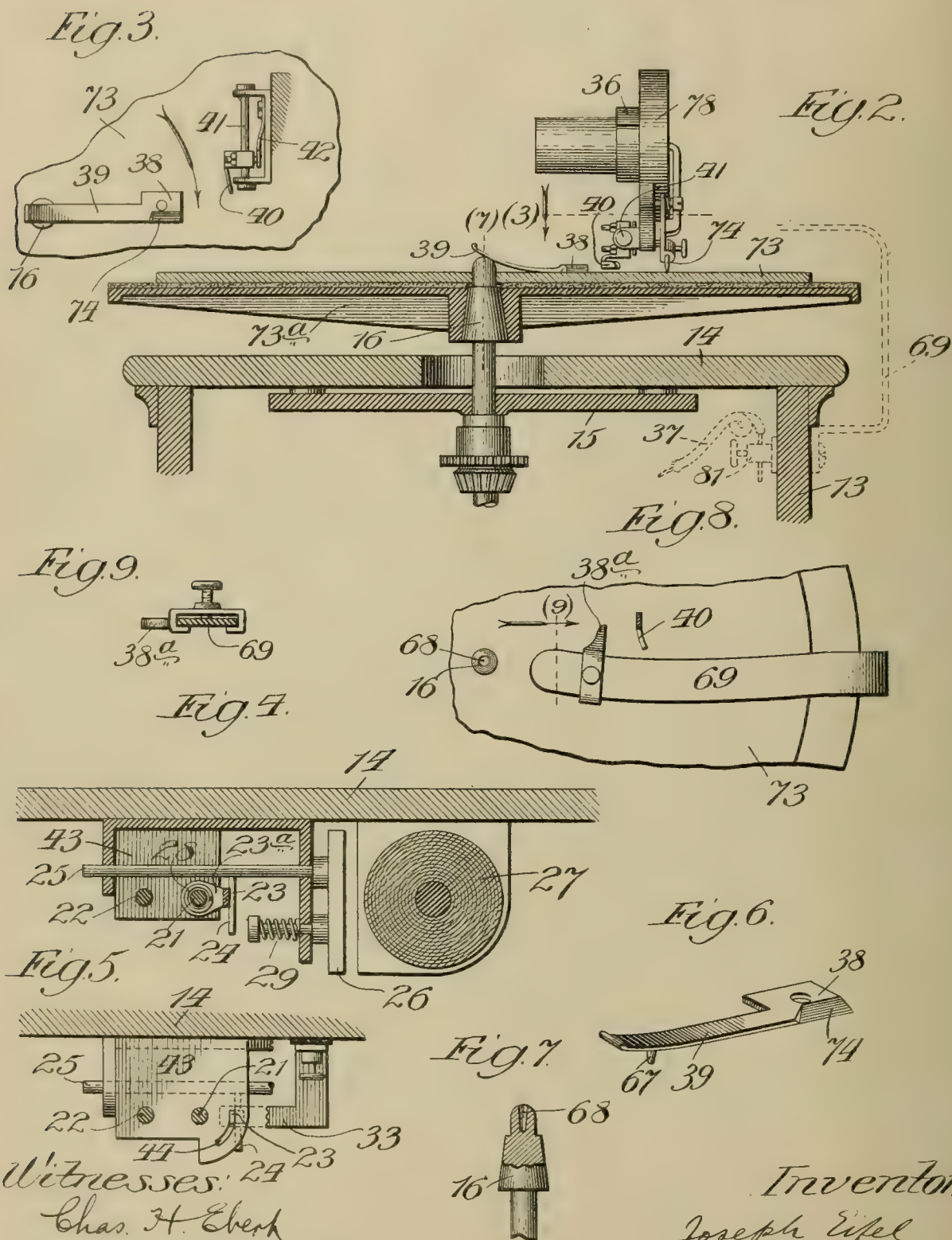


J. EIFEL.

AUTOMATIC CUT-OFF FOR SOUND REPRODUCING MACHINES.

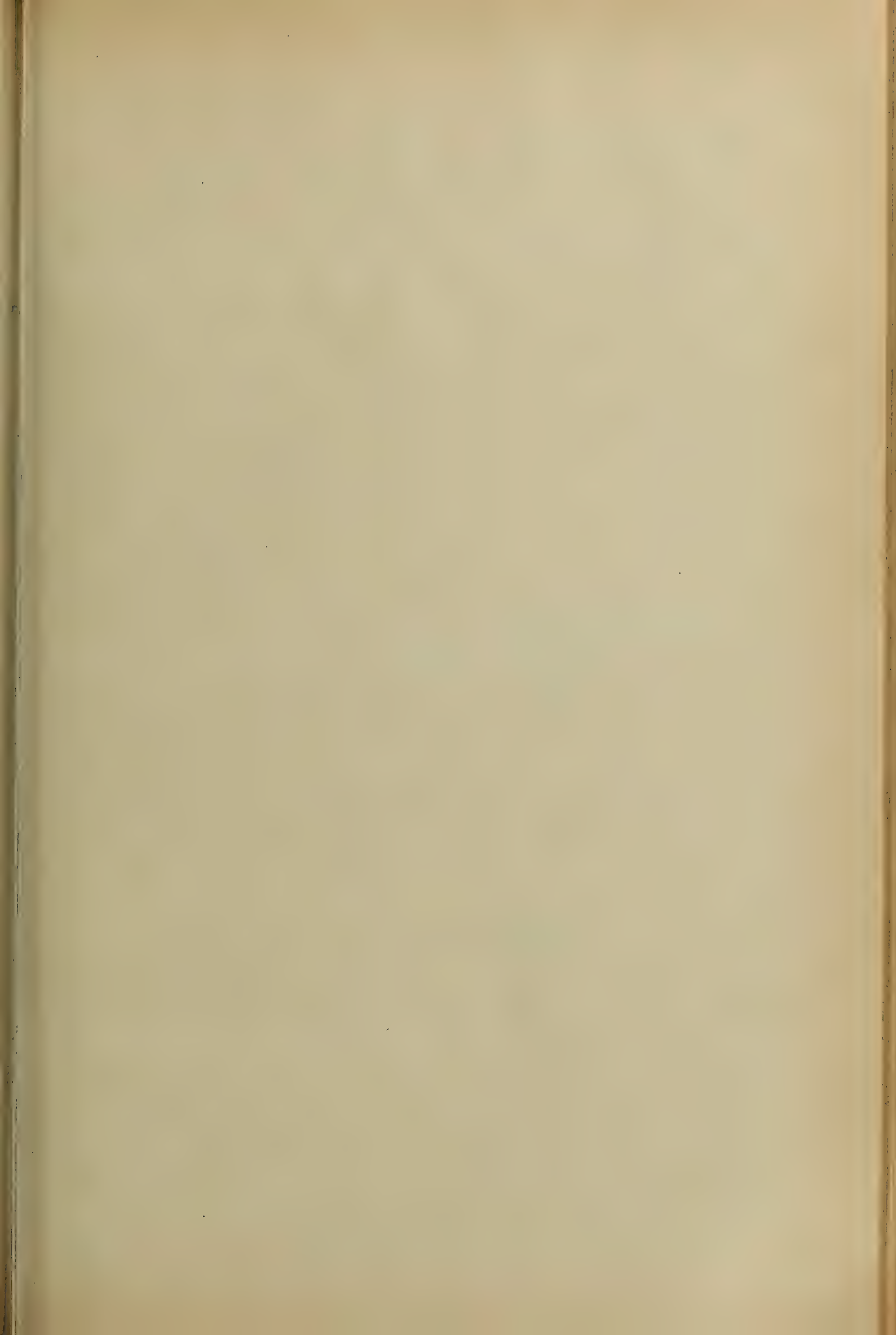
APPLICATION FILED JUNE 13, 1904.

3 SHEETS—SHEET 2.



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Inventor:
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By Paul Symmestrett
Atty.



J. EIFEL.

AUTOMATIC CUT-OFF FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED JUNE 13, 1904.

3 SHEETS—SHEET 3.

Fig. 10.

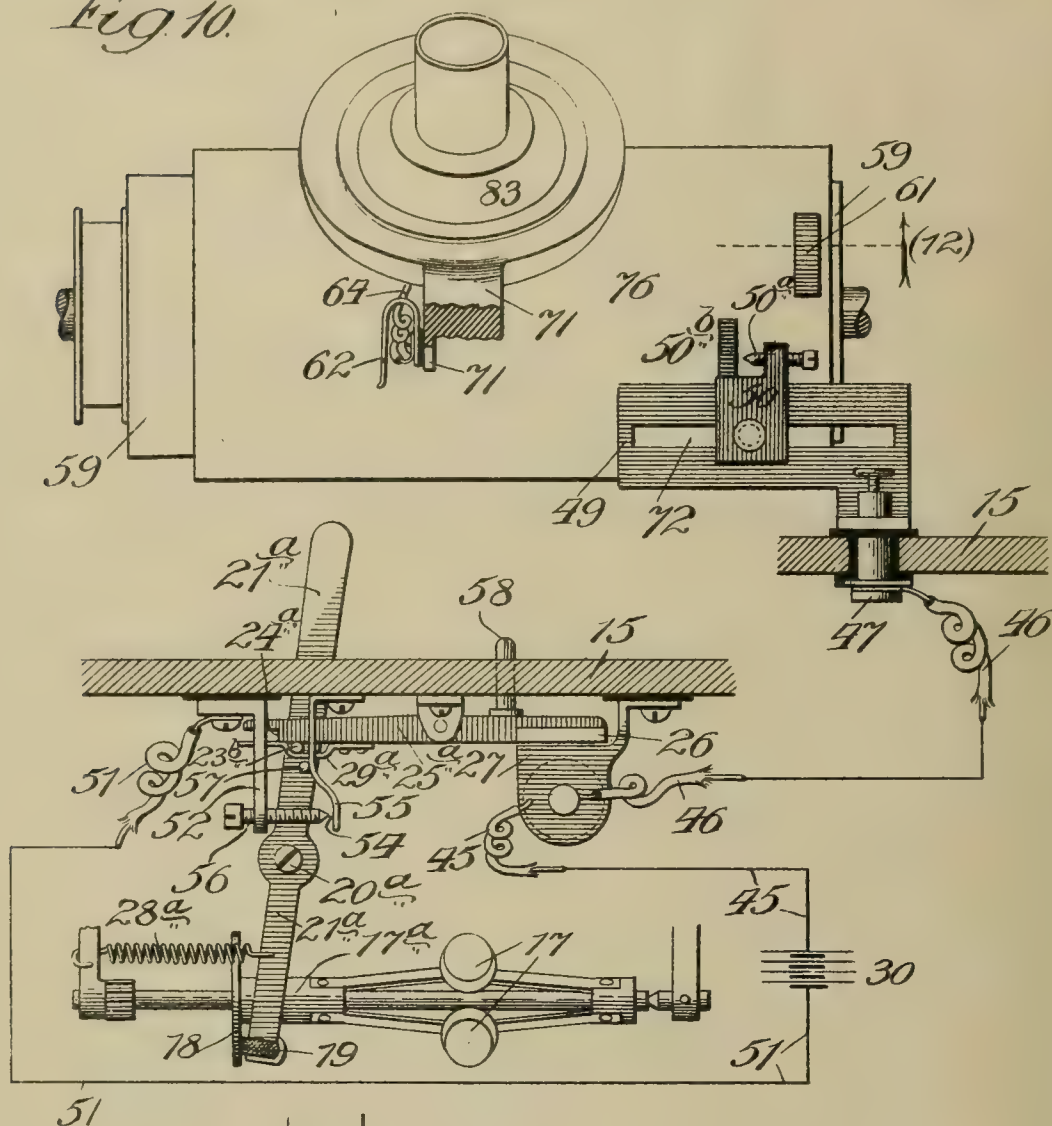


Fig. 11.

Witnesses:

Chas. H. Clark
Herman Fehner

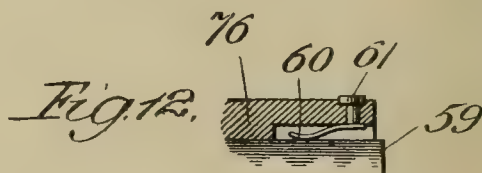
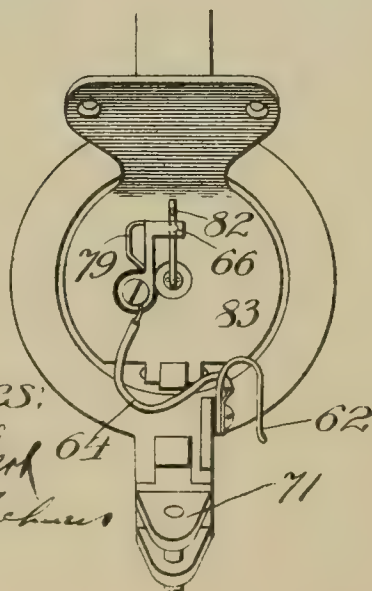


Fig. 12.

Inventor:

Joseph Eifel

By Paul Symmestredt
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH EIFEL, OF CHICAGO, ILLINOIS.

AUTOMATIC CUT-OFF FOR SOUND-REPRODUCING MACHINES.

No. 821,629.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed June 13, 1904. Serial No. 212,261.

To all whom it may concern:

Be it known that I, JOSEPH EIFEL, a citizen of the United States, residing at Chicago, in the State of Illinois, have invented certain new and useful Improvements in Automatic Cut-Offs for Sound-Reproducing Machines, of which the following is a specification.

My invention relates to sound reproducing instruments wherein a record is rotated and thereby sounds are reproduced, and to means for automatically stopping such instruments at either the end of the record or at any predetermined point on the same; and for the purposes of illustration, I have shown my device attached to a disk and to a cylinder phonograph, but it will be apparent that it could as operatively be applied to any other form of talking machine or music box. The principal objects of my invention are, to provide a cheap, safe, and accurate means for automatically stopping the rotation of the record on sound reproducing machines at any desired point during their reproduction, or at a predetermined point when the complete record is not used; to provide accurate means for automatically stopping the rotation of the record when the end of the sound groove is reached, and to generally cheapen the cost of and improve the efficiency of automatic cut-off devices for sound reproducing machines. These objects, and other advantages which will hereinafter appear, I attain by means of the construction illustrated in preferred and modified forms in the accompanying drawings, wherein:—

Figure 1 is a sectional view through the case of a disk phonograph with the cover of the case raised to show a plan view of the driving mechanism and my cut-off device;

Figure 2 is a sectional view on line (2) of Figure 1, showing the disk and sound box above the case, but not showing any of the driving mechanism;

Figure 3 is a broken top plan view of a portion of the disk and sound box on line (3) of Figure 2, showing the parts of my device applied to the disk and sound box;

Figures 4 and 5 are vertical sectional views on lines (4) and (5) of Figure 1, respectively, showing details of the circuit closer and magnet;

Figure 6 is a detail showing the plate of my device which is secured to the disk, and an alternate means of contacting it with the driving shaft;

Figure 7 is a partly cross sectional view of

the end of the driving shaft taken on line (7) of Figure 2;

Figures 8 and 9 show a modification of my device, and are respectively, a top plan view of the arm which extends over the disk, and a cross section on line (9) of Figure 8;

Figure 10 is a diagrammatic view partly in section through the case of a cylinder machine equipped with my device, and showing in elevation the cylinder and the parts of my device above the case; and

Figures 11 and 12 are detail views of the under side of the sound box and a portion of the cylinder (on line 12 of Figure 10), respectively, showing the terminals carried by the two parts.

The mode of operation of my device is the same in both machines, and I will describe at length the operation of the device on a disk phonograph, but by reference to analogous parts in Figures 10, 11, and 12, it will be readily seen how my device can as operatively be applied to a cylinder machine.

Referring now more particularly to Figures 1, 2, and 3, 13 is the frame of the case inclosing the phonograph, to the cover 14 of which are secured the various parts of the driving mechanism, by means of the plate 15, and my cut-off device secured by means of the frame 43 or other suitable connection.

The means for driving the phonograph do not form any part of my invention, which is designed to be easily attached to the sound reproducing machines now commonly on sale, by making a few changes in the minor parts used in starting and stopping such machines. Therefore, no reference will be made to the details of the motive power except to the centrifugal governor 17 which controls the motor and the attached system of gears. The slidable member 17^a of the governor carries the brake disk 18. The brake shoe, 19, carried by the bell-crank lever 19^a pivoted at 20 and actuated by the rod 21 and adjusted by the threaded rod 22, directly arrests the motor, when the machine is in operation, by means of the frictional engagement of the brake shoe with the brake disk. The rods 21 and 22 and their connected parts are carried by the cover 14 by means of the frame 43. Suitably attached to the rod 21, as by the arm 23^a (Figure 1), is a catch 23 designed to engage with the trigger 24, which is carried by the guide arm 25 of the armature 26 of the magnet 27. A spring 28 is provided to actuate the rod 21 when the

catch 23 is released from engagement with the trigger 24 by the action of the magnet 27 upon the armature 26, as hereinafter described. A spring 29 is provided to insure the engagement of the trigger with the catch when the rod 21 is pulled to the right to start the machine. The connections from the battery 30 to the magnet 27 by the wire 31, and through the wire 32 to the spring contact 33, will be apparent, and the circuit is completed through the wire 34 and connection 35 to the carrying arm 36 and the sound box arm. When the phonograph is under way, the parts of my device are in the position shown in Figure 1 and the current is conducted from the spring 33 through the arm 23^a and the frame 43 to the wire 37, secured to the plate 15, and from the plate to the driving shaft 16, (Figure 2), which drives the disk plate 73^a and through it, rotates the record disk 73. From the shaft 16, the circuit passes to the plate 38 secured to the disk, by the contact with the driving shaft of the sensitive spring 39. The other end of the circuit, through the carrying arm 36, and the sound box arm, is conveyed to the spring finger 40 which is attached to the sound box 78 by suitable means, such as shown in Figure 3. The spring finger 40 is allowed rotary movement on its shaft 41 in order to protect the stylus from any sudden jar caused by the contact of the terminals 38 and 40, but a sensitive spring 42 is provided to maintain the spring finger 40 normally in a vertical position. In the side of the frame 43 (see Figure 5) which carries my cut-off device, is provided a slot 44 which accommodates the end of the arm 23^a, and by means of this slot the rod 21 is allowed rotation of about forty five degrees, but the coil spring 28 acts to normally prevent such rotation.

As shown in Figure 6, the spring 39 of plate 38 is provided with a pin 67 to engage the mortise 68 in the driving shaft 16, (Figure 7) if desired, and the plate 38 is preferably provided with an inclined front edge 74 in order to make contact gradually with the spring finger 40.

Referring now to Figures 10, 11, and 12, showing the application to a cylinder phonograph, it will be seen that the battery circuit is made through the wire 45 and coil 27, insulated from plate 15, and the wire 46, through the connection 47 (which is fastened to the plate 15 but insulated therefrom) to the standard 49, also secured to but insulated from the plate 15. The other end of the circuit through the wire 51, is conducted to the hanger 52, and contact screw 56, carried on but insulated from the plate 15. As shown in Figure 10, the circuit is broken at point 54 but will be completed at this point when the lever 21^a (pivoted at 20^a) is moved to the left to start the machine, by releasing the detent spring 55 on removing the stop 57.

This spring makes circuit through plate 15 and the mandrel 59, carried in the usual manner in bearings supported on the plate, and thence by the spring 60 (see Figure 12) to the metal insert 61 provided in the cylinder record 76. The two terminals are thus the standard 49 and the insert 61. A suitable rider such as the spring 62, is attached to the sound box holder 71 to engage with the standard 49, when the reproducer has traversed the greater part of the record. This rider is made of any flexible conducting material, and is insulated from the holder 71 (Figure 12) but is in contact with the wire 64 which connects with the insulated spring finger 79. A spring 66 is arranged in any suitable manner to protect the stylus 82 from the danger of striking the insert 61. The current is thus passed to the spring finger 79 and the circuit will be completed when it engages the insert 61.

In Figures 8 and 9 (and in dotted lines in Figure 2) I have shown a modification wherein one terminal of the circuit is the sliding finger 38^a which is secured adjustably on the arm 69, which is carried by the case 13, so that the circuit is made from the magnet through the wire 37, directly to the arm at 81 as outlined in Figure 2.

In Figure 10 I have shown another modification in which a rod 72 having a keyed sleeve 50 slidably mounted thereon, carries a screw 50^a to engage the holder 71. A guide 50^b for the accurate adjustment of the screw 50^a with reference to the sound groove is also provided on the sleeve 50.

The operation of my device on a disk machine with the motor rotating disk 73, is as follows: The stylus 74 moving in the sound groove, will carry the spring finger 40 toward the center till it makes contact with the plate 38. The inclined edge 74 of the plate 38 provides a gradual connection with the finger 40, in order to prevent injury to the sound box or the stylus. If a good connection is not secured on the first contact, it will be secured on another revolution of the disk when the stylus will have moved perceptibly toward the center and the spring finger will then engage the slant of the plate at 74 and be rotated upward and consequently inward toward the center of the disk, thus making a perfect connection, without conveying any motion to the stylus. By abruptly covering the unused portion of the record by widely separated sound grooves, the contact of the terminals could be facilitated, as will be obvious. Immediately upon the circuit being closed, the magnet 27 will operate upon the armature 26 and the trigger 24 will release the catch 23, and the spring 28 will actuate the rod 21, which, by its connections as described, will move the brake shoe 19 against the disk 18 and thereby arrest the motor.

By releasing the catch the circuit is broken

at the point 75 by the movement of the arm 23^a away from the spring 33, thus obviating any danger of a closed circuit.

It will be apparent that when the supporting arm 69 is substituted and connected as described, the circuit will be similarly completed when the spring 40 makes contact with the finger 38^a. The finger 38^a can be placed in a predetermined position so that the rotation of the record will be stopped when the end of the sound groove is reached, or at any intermediate point as desired. The spring finger 40 will make contact with the finger 38^a and, as shown in Figure 3, is allowed rotatable movement, but kept in place by the sensitive spring, so that there is no danger of injuring the stylus when the connection is made, if the action of the magnet should for any reason not be immediate. But the use of arm 69 will generally obviate the necessity of any fixture on the record plate.

In the operation of my device on the cylinder machine as shown in Figure 10, the stop 23^b is retained in engagement with the trigger 24^a by means of the spring 29^a, and the spring 55 and screw 56, complete the circuit to the insert 61, when stop 57 is removed on releasing the brake. When the reproducer moves down to the end of the cylinder, and the rider 62 engages the standard 49, the circuit is completed to spring finger 79, and when the terminals 61 and 79 make contact, the circuit closes and the magnet 27 operates the armature 26 releasing the stop 23^b from engagement with the trigger 24^a, and the lever 21^a is returned to its first position by means of the spring 28^a, thereby moving the brake shoe 19 into engagement with the disk 18 and arresting the motor, and, by means of stop 57, breaking connection between the screw 56 and spring 55. As will be apparent in the modification, where the screw 50^a engages with the sound box holder 71, the action of the magnet is the same. The sleeve 50 can be moved longitudinally on the rod 72, (which can be extended the entire length of the record if desired), and by means of the guide 50^b, the rotation of the record may be stopped at any predetermined point.

As shown in Figure 5 and as above described, the rod 21 is allowed rotary movement and thus the catch 23 may be released from the trigger 24 when it is desired to manually stop the rotation of the record. In such event, the action of the brake shoe on the brake disk of the governor, is the same as when the magnet acts on the armature, and the parts will return to the same position as when my device operates on the brake. In Figure 10 is shown a plunger rod 58 which operates, when pressed down to release the trigger 24^a through the arm 25^a and the operation of the brake is the same as when the magnet 27 releases the trigger by acting on the armature 26.

It will be obvious that by accurately placing the plate on the disk or the insert on the cylinder, with reference to the termination of the sound groove, that the record will be stopped immediately upon its complete reproduction, thus eliminating the unpleasant sounds now frequent in phonographs due to the traversing of the unrecorded portion of the record by the stylus. As accurate an adjustment is obtained when the modified forms shown in Figures 8, 9, and 10 are used, and the sliding terminals can be placed so as to stop the record at any predetermined point.

It will be understood that my device could be as well applied to recording as reproducing machines, and that any details of wiring or the general arrangement and action of parts of my device might be altered without departing from the spirit of my invention.

The many advantages of my automatic cut-off will be apparent to those familiar with sound reproducing machines and their operation.

Having thus described my invention and illustrated its use, what I claim as new, and desire to secure by Letters Patent, is the following:

1. In a sound reproducing machine, the combination with driving mechanism and electric means for braking the driving mechanism of co-operating means carried by the frame and sound box holder respectively, whereby the driving mechanism will be stopped by the brake at any predetermined point.

2. In a sound reproducing machine the combination with a brake and electric means for releasing the brake to stop the driving mechanism, and two terminals for the electric circuit carried one on the record, and one on the sound box holder whereby the driving mechanism will be stopped at a predetermined point on the record.

3. The combination with driving mechanism for a sound record, and electro-magnetic means for stopping said driving mechanism, of a moving contact forming part of the electric circuit, and a contact carried by the record to co-operate with the first mentioned contact to close the circuit and operate the stopping mechanism, substantially as described.

4. In a sound recording machine the combination with a driving mechanism and brake therefor, of an electro-magnetic device for manipulating the brake and means for closing the circuit for this purpose comprising a terminal on the record, and a contact on the moving sound box holder, the terminal being adjustable and operating automatically to stop the movement of the record at the termination of the sound groove.

5. In a phonograph the combination with electro-magnetic means for stopping the driving mechanism thereof, of a circuit for the magnet comprising one terminal carried by

the sound box or its holder and another terminal placed at a predetermined position on the sound record, and adapted to close the circuit to stop the machine at a predetermined point.

- 5 6. The combination with the driving mechanism, of an electric brake, means for closing the electric circuit comprising contact points carried on the sound box, and on a fixed part of the machine, and the position of said lat-

ter contact point being adjustable, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

JOSEPH EIFEL.

Witnesses:

F. W. H. CLAY,
EDWARD C. BURNS.

No. 822,024.

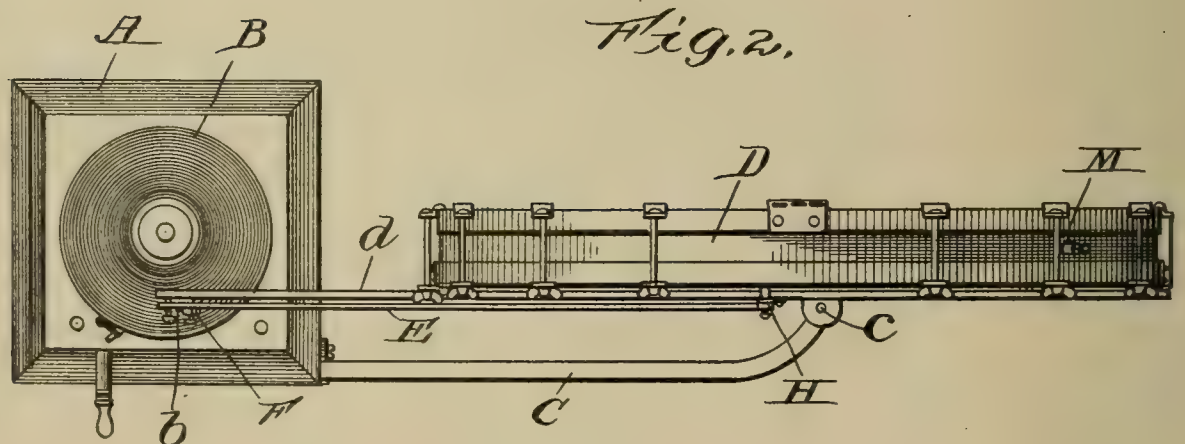
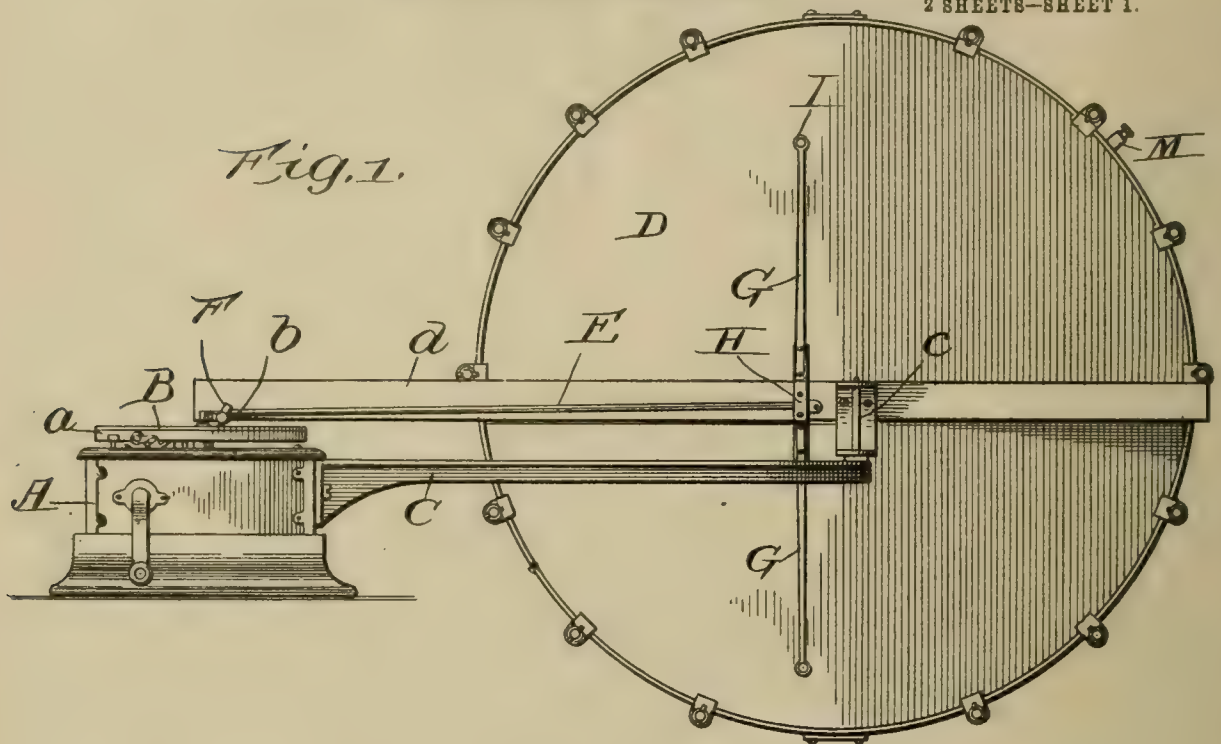
PATENTED MAY 29, 1906.

F. F. SHANKS.

PHONOGRAPH, GRAMOPHONE, AND OTHER SIMILAR SOUND
REPRODUCING MACHINES.

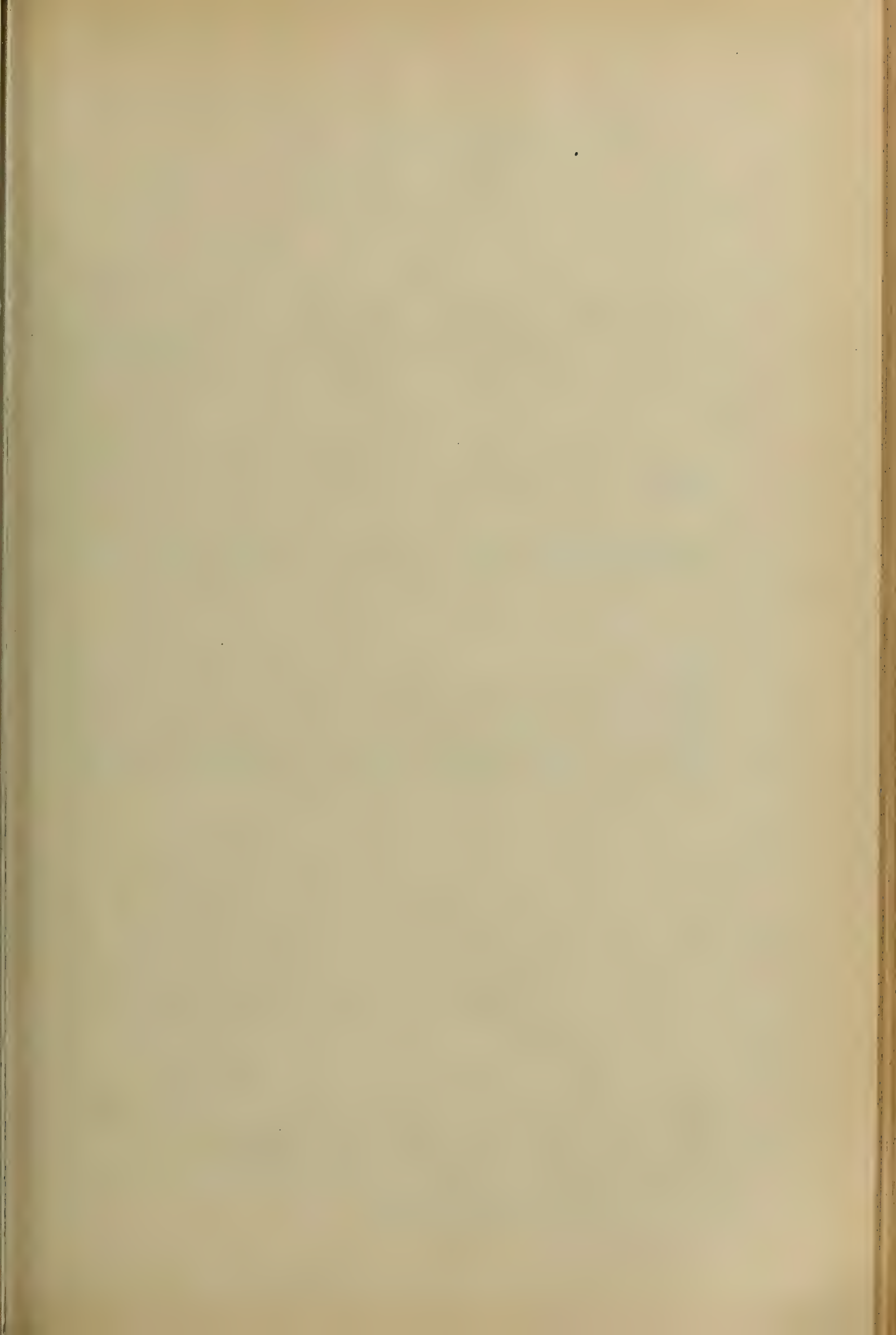
APPLICATION FILED FEB. 20, 1906.

2 SHEETS—SHEET 1.



Witnesses:
O. W. Vermick
E. K. Lundy

Inventor:
Frank F. Shanks
by Frank D. Thompson
Att'y.

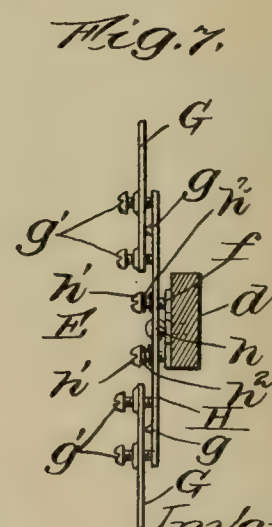
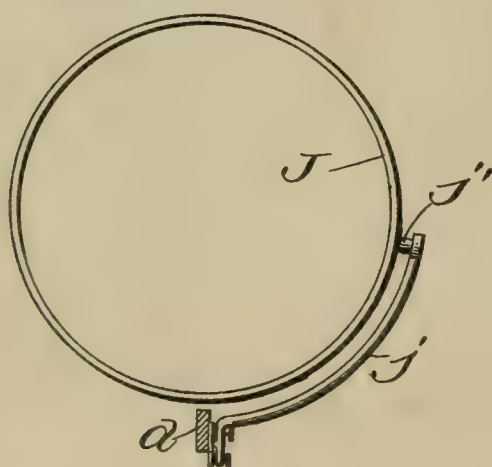
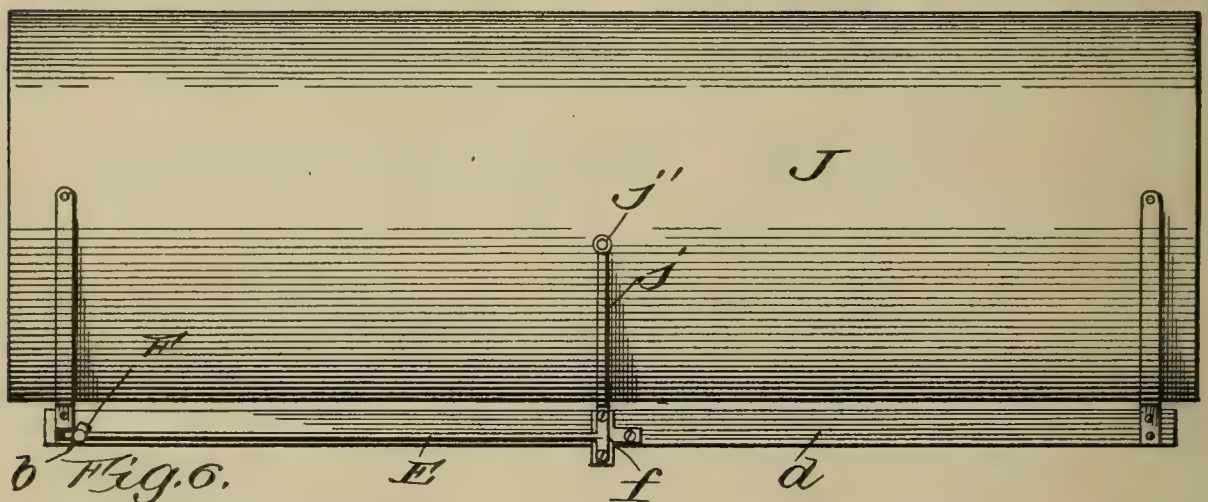
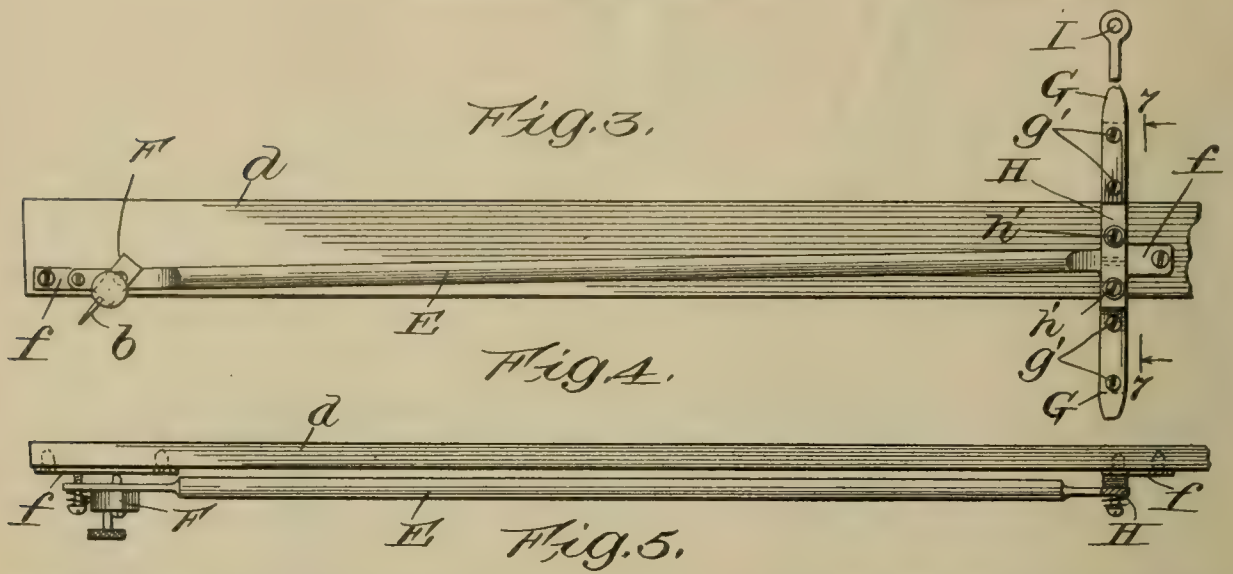


F. F. SHANKS.

PHONOGRAPH, GRAMOPHONE, AND OTHER SIMILAR SOUND
REPRODUCING MACHINES.

APPLICATION FILED FEB. 20, 1905.

2 SHEETS—SHEET 2.



Witnesses:
O. W. Hennich
E. K. Lundy.

Inventor:
Frank F. Shanks
By Frank D. Thomsen
Attys.

UNITED STATES PATENT OFFICE.

FRANK F. SHANKS, OF CHICAGO, ILLINOIS.

PHONOGRAPH, GRAMOPHONE, AND OTHER SIMILAR SOUND-REPRODUCING MACHINES.

No. 822,024.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed February 20, 1905. Serial No. 246,612.

To all whom it may concern:

Be it known that I, FRANK F. SHANKS, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonographs, Gramophones, and other Similar Sound-Reproducing Machines, of which the following is a full, clear, and exact description.

My invention relates to machines for reproducing sounds from records in what are commonly known as "phonographs," "gramophones," &c.; and its particular object is to provide means whereby sound-waves energized by the instrument are transmitted therefrom and audibly delivered at a distance from the needle or tracker engaging the record to the hearer in clear ringing tones.

Heretofore it has generally been found very difficult and well-nigh impossible to reproduce sounds from the machine in the precise manner and tone in which they were originally received by the record. This was often caused by the vibrations of the sound-waves passing through the metal horn or megaphone, and therefore the sound reproduced was "metallic" in tone and high notes or swells became harsh and rasping. These objectional features have all been overcome by my improved means for the transmission to a point beyond the range of the immediate vibratory field of the needle or tracker and the audible delivery of the transmitted sound-waves after they have been projected upon a reproducing device. I accomplish this by the mechanism hereinafter fully described in the specification and illustrated in the drawings and as more fully pointed out in the claims.

In the drawings, Figure 1 is a side elevation of one form of my improved device, showing the same in connection with a snare-drum and operating with a phonograph of the disk type. Fig. 2 is a top plan view of the same. Fig. 3 is a front elevation in detail of the sound-wave-transmission portion of my improvement. Fig. 4 is a top plan view of the same. Figs. 5 and 6 are front elevation and end views of a modified form of resonator used in connection with my improvement. Fig. 7 is a transverse vertical section taken on line 7 7, Fig. 3, looking in the direction indicated by the arrows and showing the manner of connecting and adjusting the vibrating arms.

For the purpose of a clear understanding of my invention I have illustrated the same operating in connection with a phonograph of the disk type; but it will be obvious to those skilled in the art to which this invention appertains that the same is applicable to any of the sound-reproducing or talking machines now in general use.

By referring to the drawings it will be seen that A represents the box or casing in which is housed the proper mechanism for revolving the flat circular platform *a* or the table thereof, which latter carries the usual record-disk B, from which the sound-waves are reproduced through the medium of a steel reproducer needle-point *b*. Extending horizontally from one side of the casing A is an elongated L-shaped supporting-arm C, that has arising from its outer extremity a suitable pivot stud or pin *c*, the upper portion of which latter is reduced slightly in diameter to provide a shoulder, as will be seen in Fig. 1 of the drawings. Upon the end of this arm C are supported my improved sound magnifying or intonating means, which, as will be hereinafter more fully described, may consist of a drum-shaped disk or resonator, a hollow elongated cylinder, a banjo, violin, or other stringed musical instrument from which the sound-waves are vibrated or deflected in a greater or increased volume than received. For the sake of convenience I will describe the same in connection with the drum-shaped resonator D illustrated in Figs. 1 and 2 of the drawings. This resonator D is preferably constructed similar to an ordinary snare-drum, except that in place of the usual sheepskin or parchment covering it is provided with a covering of cloth coated with a fibrous composition or paper and its dimensions are approximately twenty-four inches in diameter by one and one-half inches in thickness. These dimensions are not essential, however, and while I prefer to use the covering above described the usual sheepskin covering may be employed without departing from the principle of my invention. Bridging across the face of the resonator D, but not in contact with the surface thereof, is a straight shaft *d*, that projects beyond the edge of the resonator nearest the phonograph until its end is over the center of the record-disk. This shaft is used as a support for the resonator D, as well as to carry the means for holding the sound-vibrating de-

vices and vibrators now to be described. These sound-vibrating devices comprise an elongated rock-bar E, extending from near the outer end of the shaft *d* to about the center of the resonator D, and the same is supported away from said shaft *d* by fulcrum-pivots *x* and is adjustable toward and away from said shaft by set-screws at either end of the same engaging with a screw-plate *f*, mounted upon the contiguous portion of the shaft. On the outer end of this rock-bar E is mounted at a tangent angle thereto the needle-carrying block F, which is preferably secured thereto by means of a suitable adjusting-screw. The needle-point *b* is adjustably held in said block F by means of a small thumb-screw in order to readily remove and replace the same whenever so desired. This bar E is rocked by the engagement of the needle-stylus *b* with the record-disk, and said rocking motion of the bar imparts a vibratory movement to arm G, hereinafter referred to. At the end of the rock-bar E opposite said needle is fastened a suitable transverse plate H, that is provided mediate its extremities with a fulcrum-pivot *h*, and in order to adjust either end of said plate suitable adjusting-screws *h'* are provided, one on each side of said pivot, while between the heads of said screws and said plate are interposed suitable coil-springs *h*². Near each end of said plate H are suitable fulcrum-pivots *g*, that form ribs extending across the width of the plate, and upon which is fulcrumed the contiguous flattened end of said vibrator-arm G. These vibrator-arms G are adjustable toward and away from the surface of the resonator by suitable set-screws. *g'* Upon the ends of each of these vibrator-arms G are mounted suitable hammers I, the surfaces of which are preferably formed of or covered with rubber or other suitable material. These hammers are adapted to be rapidly vibrated against the face of the diaphragm or resonator D and to impart thereto the bodily-vibratory movements transmitted to said hammers through the rock-bar E, said vibrations being in direct accord with the sound undulations on the record-disk.

When the machine is in operation, the sound-waves are imparted by the revolving disk B to the needle-point, and the vibrations thus created are conveyed along rod E and transmitted therefrom to the vibrating arms G. These arms G are caused to rapidly vibrate and the hammers I on their ends throw off the vibrations against the adjacent face of the resonator F, which latter reproduces the sound-waves and intensifies the same in clear full tones.

While it is not absolutely essential, I may construct the drum-shaped resonator airtight and provide an outward pressure-valve M in the edge thereof. By forcing air between the heads of the drum or resonator

the tension of the face thereof may be adjusted to a nicety and a purer tone obtained thereby.

In the modification shown in Figs. 5 and 6 in place of the drum-shaped resonator described heretofore I employ a hollow elongated cylinder J, made of any suitable resonating material that is preferably stretched over a suitable framework and formed airtight. In this modification the supporting-shaft *d* and rock-bar E, as well as the reproducing-needle *b* and the means for adjusting said bar E, are all similar in construction to the corresponding elements described in connection with resonator D. The vibrating arm, however, is of a segmental character, and its curvature corresponds with the curvature of the outer circumference of said cylinder and extends around the same about one-quarter of the circumference thereof. A hammer *j'* is also provided, which, if desired, may be similar to the hammer I.

When different kinds of musical selections are to be reproduced by the phonograph, I have found it very advisable to employ different kinds and sizes of resonators. When the record contains a violin solo, it has been found that by substituting a violin in place of the "drum," hereinbefore described, and permitting the vibrating arm, which may be covered with rubber, to pass over all the strings thereof, that the sound-waves and tone of reproduction are decidedly more natural and the music is not harsh or rough, as is now the case with phonographs employing a horn or megaphone. By substituting the proper instrument for one similar to the instrument used in making the record much better results have been attained. It has been found also that an orchestral or band selection is better reproduced by mounting an entirely metallic cylinder similar to that shown in Figs. 5 and 6 upon the supporting-shaft, and when it is desired to reproduce the human voice it has been found that the drum hereinbefore described is the most satisfactory.

What I claim as new is—

1. In combination, a phonographic record; devices engaging the sound-interlineations thereon; a solid bar for transmitting the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said devices; and disconnected means for audibly reproducing said vibrations at the opposite end of said bar.

2. In combination, a phonographic record; devices engaging the sound-interlineations thereon; a solid bar directly engaging said devices which transmit the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said devices; and disconnected means for audibly reproducing said vibrations at the opposite end of said bar.

16. In combination, a phonographic record; a needle engaging the sound-interlineations thereon; a fulcrumed rod for transmitting the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said needle; vibratory arms carried by said rod that are fulcrumed mediate their length and adjustable independent of each other; and means for reproducing said vibrations at the end of said rod nearest said vibratory arm.

17. In combination, a phonographic record; a needle engaging the sound-interlineations thereon; a yielding-fulcrumed rod for transmitting the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said needle; vibratory arms carried by said rod that are fulcrumed mediate their length and adjustable independent of each other; and means for reproducing said vibrations at the end of said rod nearest said vibratory arm.

18. In combination, a phonographic record; a needle engaging the sound-interlineations thereon; a rod for transmitting the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said needle; adjustable vibratory arms carried by said rod that are fulcrumed mediate their length and adjustable independent of each other, and means for reproducing said vibrations at the end of said rod nearest said vibratory arm.

19. In combination, a phonographic record; a needle engaging the sound-interlineations thereon; a rod for transmitting the vibrations resulting from said engagement to a point beyond the range of the synchronous sympathetic vibrations of said needle; adjustable fulcrumed vibratory arms carried by said rod that are pivoted mediate their length independent of each other; and means for reproducing said vibrations at the end of said rod nearest said vibratory arm.

20. In a phonograph, the combination with a record having superficial sound-interlineations thereon, and mechanism for revolving the same; of devices engaging said sound-interlineations, consisting of a horizontal rod extending from within the circumference of said record to a point beyond the same; a needle carried on the inner end thereof and adapted to engage said interlineations; a vibratory arm mounted on the opposite end of said rod; and disconnected means for audibly reproducing the vibrations caused by the engagement between said needle and said interlineations.

In testimony whereof I have hereunto set my hand this 10th day of February, A. D. 1905.

FRANK F. SHANKS.

Witnesses:

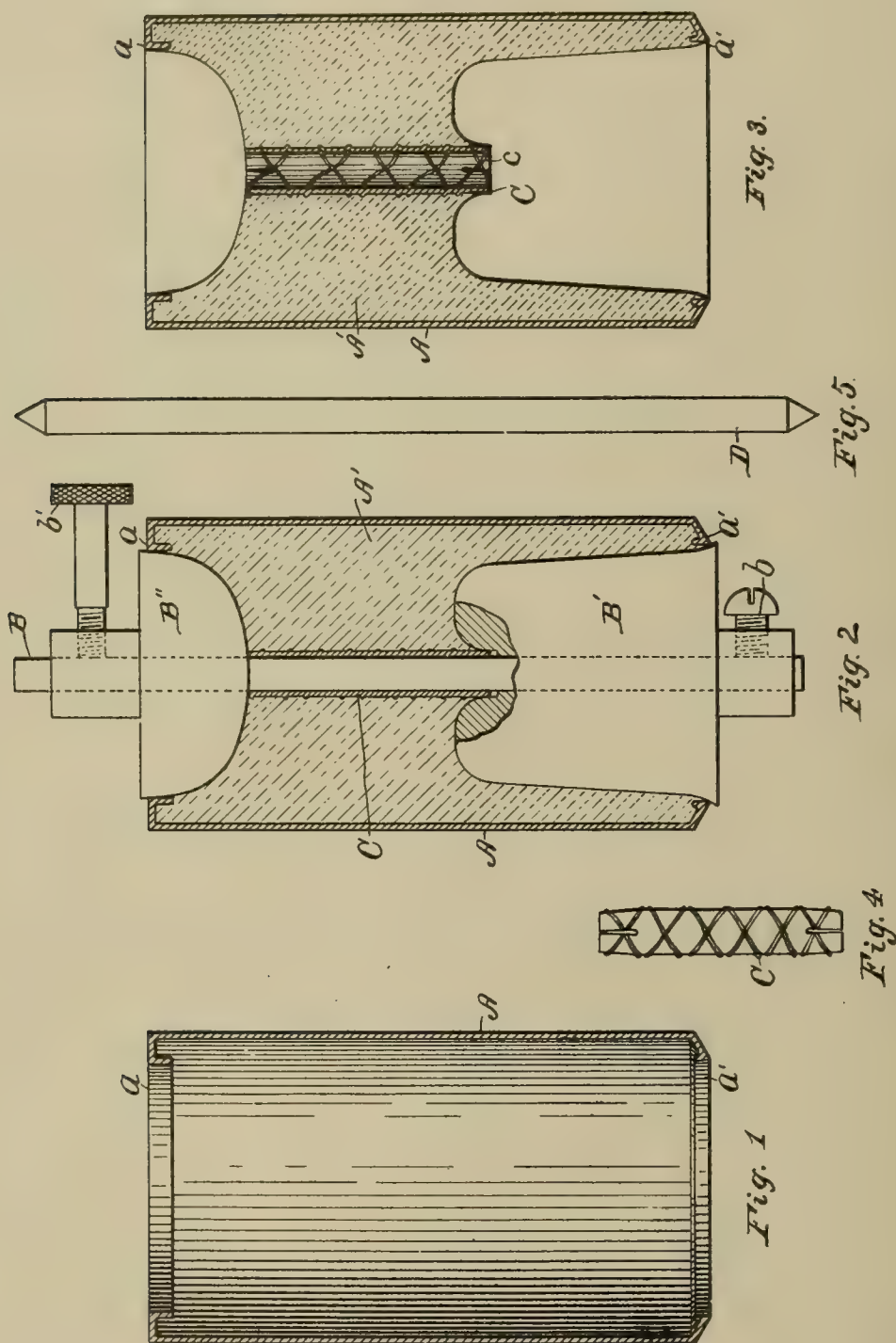
FRANK D. THOMASON,
E. K. LUNDY.

No. 822,485.

PATENTED JUNE 5, 1906.

C. C. SHIGLEY & S. H. PAXTON.
RECORD ROLL FOR PHONOGRAPHS.

APPLICATION FILED OCT. 26, 1904.



Witnesses:

J. B. Mergerson
Adelaide & Adams

Inventors,

Cyrus C. Shigley & Sherman H. Paxton
By Chappell & Carl
Att'ys

UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY, OF HART, AND SHERMAN H. PAXTON, OF GRAND RAPIDS, MICHIGAN.

RECORD-ROLL FOR PHONOGRAPHS.

No. 822,485.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed October 26, 1904. Serial No. 230,140.

To all whom it may concern:

Be it known that we, CYRUS C. SHIGLEY, residing at the village of Hart, county of Oceana, and SHERMAN H. PAXTON, residing at the city of Grand Rapids, county of Kent, State of Michigan, citizens of the United States, have invented certain new and useful Improvements in Record-Rolls for Phonographs, of which the following is a specification.

This invention relates to improvements in record-rolls for phonographs.

The objects of this invention are, first, to provide an improved record-roll for phonographs which will produce loud, distinct, and full tones, which is simple in structure, economical to produce, and durable in use; second, to provide an improved record-roll for phonographs adapted to be used upon a mandrel or shaft of even diameter from end to end.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of our invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central longitudinal sectional view through our improved record-roll for phonographs. Fig. 2 is a central longitudinal sectional view through one of our improved record-rolls for phonographs in process of manufacture, a portion of the core B' being broken away to show its construction. Fig. 3 is a central longitudinal sectional view through one of the record-shells A used in the manufacture of our improved record-rolls. Fig. 4 is a side elevation view of the mandrel or shaft sleeve C. Fig. 5 is a side elevation view of a mandrel D, adapted to receive our improved record-roll.

In the drawings similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the outer shell A is formed of celluloid or other suitable composition adapted to receive and retain a pho-

nographic record. This shell is cylindrical in form and is provided with inturned flanges *a* *a'* at its ends. The shell A is provided with a backing or filling A' of some suitable plastic material, preferably plaster-of-paris, which is preferred, as it is comparatively light and is adapted to be poured or cast and is also adapted to set or harden at ordinary temperatures.

A mandrel or shaft sleeve C is embedded and retained in the filling or backing material A'. This sleeve is adapted to be slipped upon a mandrel or shaft D, such as is illustrated in Fig. 5. This shaft is of substantially even diameter from end to end, except for its bearing-pivots, so that the record-rolls may be adjusted to any position thereon. The sleeve C is provided with spiral corrugations *c*, which when embedded in the filling material prevent its withdrawal. The sleeve C is slitted at each end, as clearly appears in Fig. 4, and the slitted portion deflected inwardly on the mandrel or shaft D.

Our improved phonograph record-roll as illustrated herein is particularly adapted for use on phonograph-machines such as illustrated and described in Letters Patent to Cyrus C. Shigley, issued May 5, 1903. The same is, however, adapted for use in other relations.

In the manufacture of our improved record-roll the record is first made upon the shell A. A rod-like standard B is provided. We also provide a pair of conical cores B' B'' for the ends of the record-rolls. These cores are provided with central holes adapted to receive the standard B, which effectively centers them in relation to each other. The core B' is secured to the standard B by the set-screw *b*. A thumb-screw *b'* is provided for securing the core B'' to the standard.

In forming our improved record-roll we first secure the core B' upon the standard, which is suitably supported, preferably in an upright position. The sleeve C is then slipped upon the standard and forced down upon the core B''. The filling or backing material A' is then poured or cast into the shell and the core B'' pressed into the same and secured in position by means of the thumb-screw *b'*. The filling material or backing is then allowed to set or harden. By forcing the core B' into position the filling material

is compacted, so that the shell is completely and evenly filled. The flanges *a a'* of the shell are adapted to fit the conical cores, so that the shell is perfectly centered in regard to the mandrel or shaft sleeve C.

While we prefer plaster-of-paris as backing material, as it is comparatively light and can be readily poured or cast, other materials might be used.

Although we prefer to form our improved record-roll as we have illustrated and described on account of its structural simplicity and economy, we are aware that the same may be varied considerably in structural details without departing from our invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a corrugated mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

2. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a corrugated mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

3. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

4. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material; a mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

5. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a corrugated mandrel or shaft sleeve; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

6. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material; a corrugated mandrel or shaft sleeve; a suitable plastic material molded or cast within said shell about said sleeve;

and a mandrel-shaft D, all coacting for the purpose specified.

7. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a mandrel or shaft sleeve; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft D, all coacting for the purpose specified.

8. In a phonograph-record, the combination of an outer shell of celluloid or other suitable material; a mandrel or shaft sleeve; a suitable plastic material molded or cast within said shell about said sleeve; and a mandrel-shaft, all coacting for the purpose specified.

9. In a phonographic record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a corrugated mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

10. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a corrugated mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

11. In a phonographic record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

12. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a mandrel or shaft sleeve having slits therein, said slitted portions being deflected inwardly; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

13. In a phonographic record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a corrugated mandrel or shaft sleeve; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

14. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a corrugated mandrel or shaft sleeve; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

15. In a phonographic record, the combination of an outer shell of celluloid or other suitable material, having inturned flanges at its ends; a mandrel or shaft sleeve; and a

suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

5 16. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a mandrel or shaft sleeve; and a suitable plastic material molded or cast within said shell about said sleeve, for the purpose specified.

In witness whereof we have hereunto set 10
our hands and seals in presence of two witnesses.

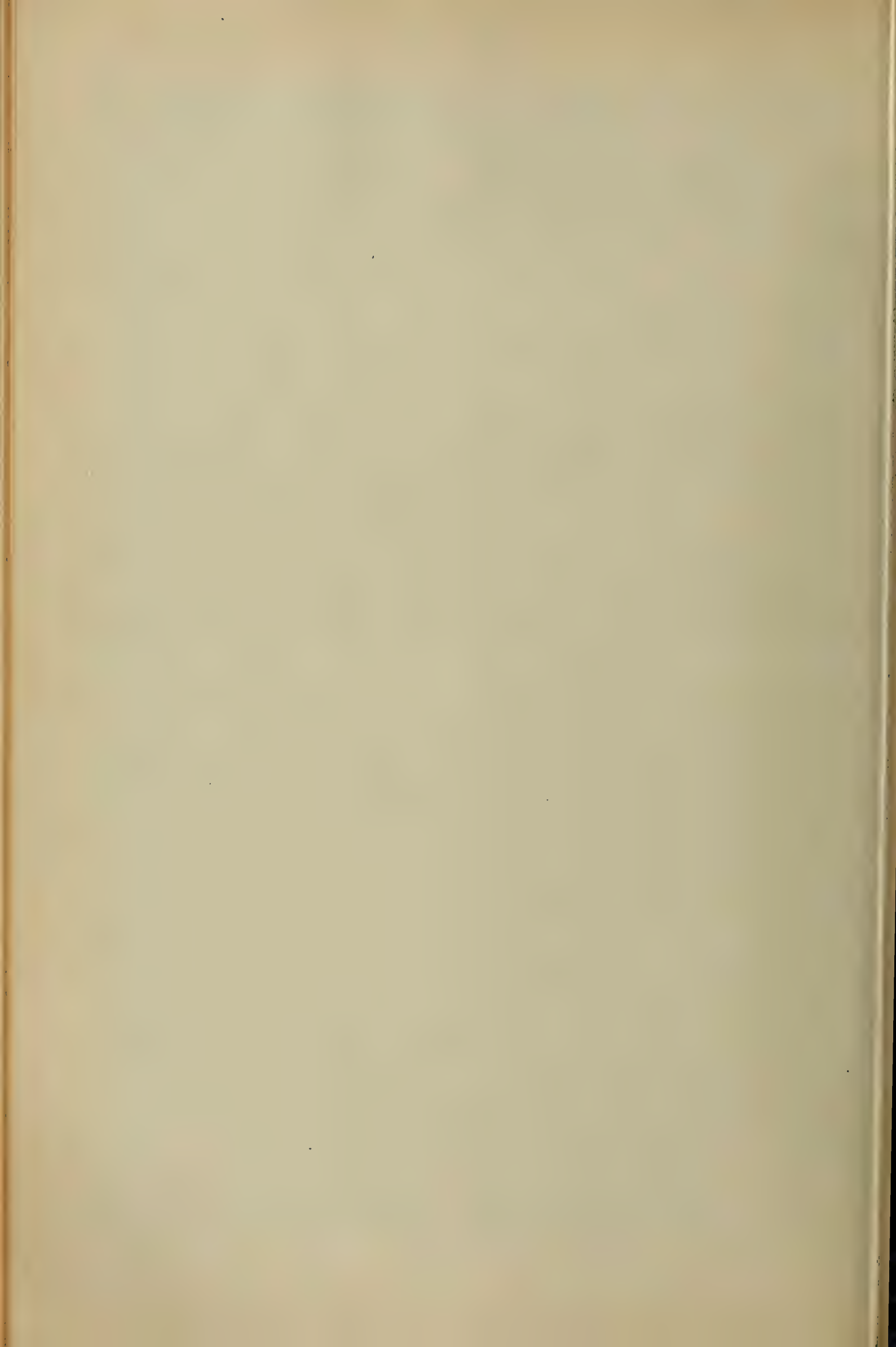
CYRUS C. SHIGLEY. [L. s.]

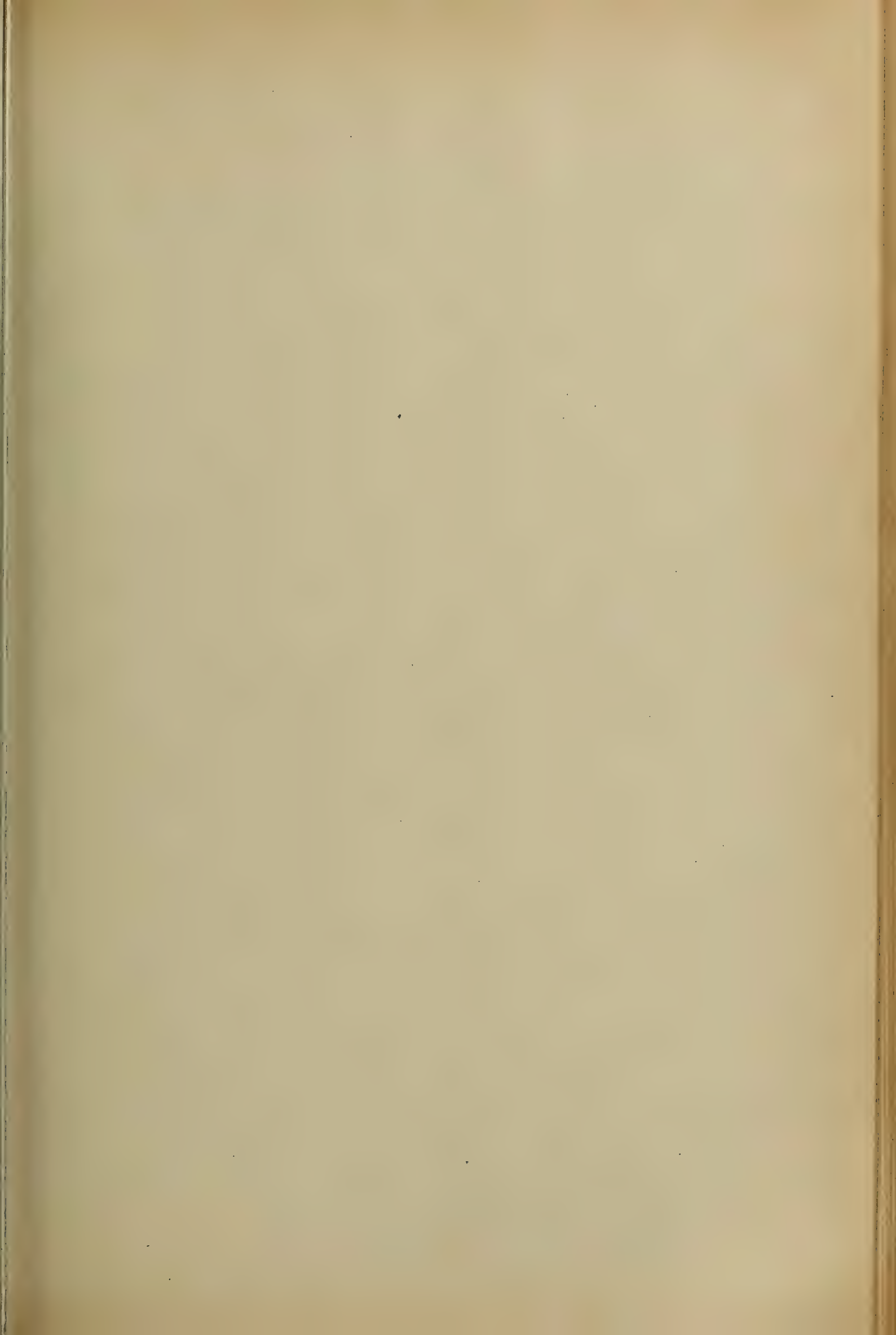
SHERMAN H. PAXTON. [L. s.]

Witnesses:

ALEXANDER S. PALMER,

D. O. SPROAT.

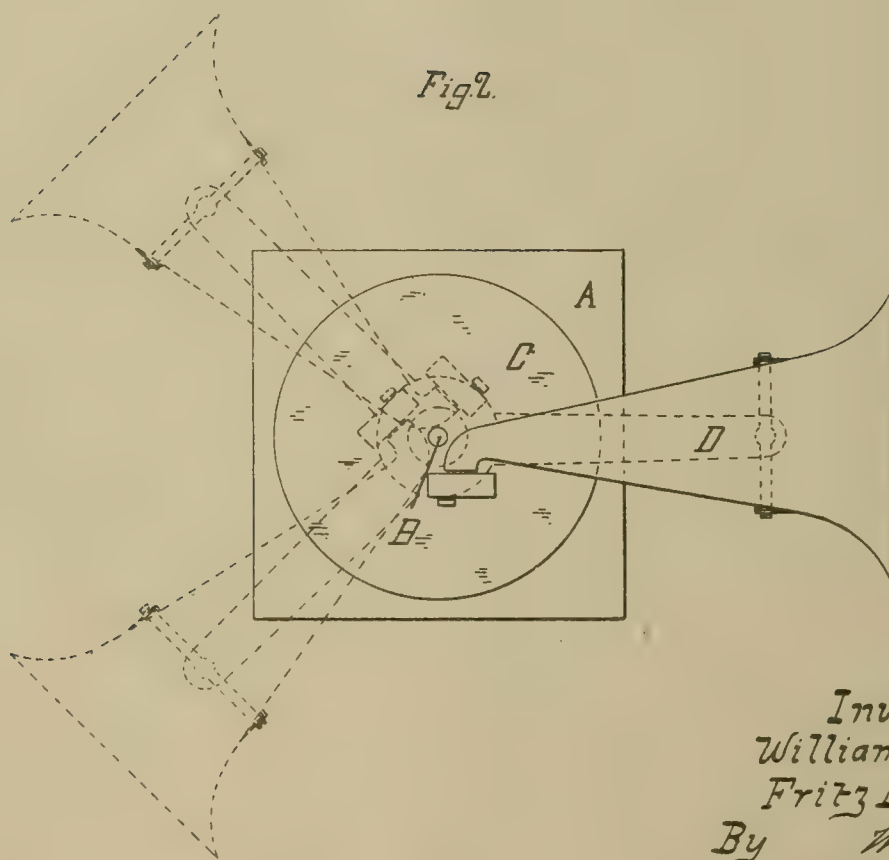
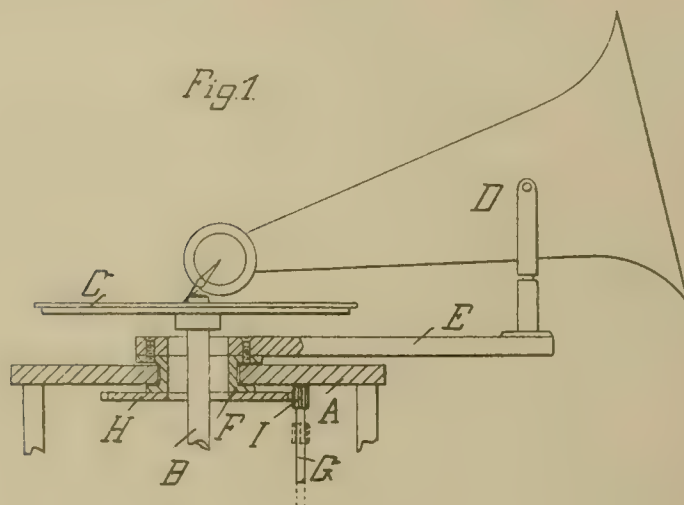




No. 824,368.

PATENTED JUNE 26, 1906.

F. & W. LOCHMANN.
TALKING MACHINE WITH ROTATABLE HORN.
APPLICATION FILED APR. 27, 1904.



Witnesses
William Miller
George Kulsberg

Inventors
William Lochmann
Fritz Lochmann
By W. C. Hauff
Attorney

UNITED STATES PATENT OFFICE.

FRITZ LOCHMANN AND WILLIAM LOCHMANN, OF ZEULENRODA, GERMANY,
ASSIGNORS TO ORIGINAL MUSIKWERKE PAUL LOCHMANN GESELL-
SCHAFT MIT BESCHRÄNKTER HAFTUNG, OF LEIPSIC, GERMANY, A FIRM.

TALKING-MACHINE WITH ROTATABLE HORN.

No. 824,368.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed April 27, 1904. Serial No. 206,041.

To all whom it may concern:

Be it known that we, FRITZ LOCHMANN and WILLIAM LOCHMANN, subjects of the King of Saxony, residing at Zeulenroda II, Reuss, Germany, have invented new and useful Improvements in Talking-Machines with Rotatable Horns, of which the following is a specification.

In talking-machines or graphophones in use the horn or sound-trumpet is permanently directed to one side, and consequently the machine is generally best heard from this side. If, however, the entire box of the talking-machine is mounted on a rotatable base, the winding mechanism partakes of the rotation and is located now at one side and then at another. These objections according to this invention are to be overcome by arranging the holder of the horn rotatably about the center axis of the talking-machine, so that by simply turning the holder or carrier the horn can be set to any direction, while the machine itself retains its position undisturbed.

This invention is illustrated in the annexed drawings, in which—

Figure 1 is a sectional view of a talking-machine with rotatable or adjustable horn. Fig. 2 is a plan view of Fig. 1.

The central axis *b* passes through the housing *a* of the machine and, as known, is intended for supporting and rotating the speaking plate or record *c*. The horn *d* is also supported, as known, on a carrier *e*.

According to this invention the carrier *e* for the horn *d* is rotatable about center axis *b*, so that it can be set to any side without requiring the housing *a* of the machine to be disturbed or its position on its base to be changed. The horn can thus be brought to various positions, as indicated by dotted lines, and allowed to throw sound in any direction. Such change of direction can also be made while the machine is in operation.

The manner in which the horn-carrier *e* is arranged to rotate about the center axis *b* is not material so far as this invention is concerned, since any well-known arrangement

can be employed for this purpose. In the example shown the carrier *e* is secured to a bushing *f*, which is rotatably connected concentric to center axle *b* to the housing *a*; but the holder *e* might as well be in form of a turn-table journaled on the housing or a ring, which in case of a ring-shaped housing might rotate thereabout or about a ring-shaped plate applied to the housing, or an arrangement of any other suitable kind could be applied for rotatably supporting the holder *e* about axle *b*. The rotation of the horn could also be accomplished mechanically by the pinion device when, for example, to the axle *g* a pinion-wheel *i* is applied, which engages a gear-wheel *h*, secured to box or sleeve *f* or to the hollow axle of rotation of the horn-carrier *e*. This arrangement can be made releasable, for example, by arranging the pinion *i* shiftably on axle *g*, so that the connection of such pinion with the gear-wheel can be made or broken, as desired. Any other desired coupling can be utilized to adapt the device for releasably conveying the movement of rotation from axle *g* to bushing *f*.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A talking-machine comprising a rotatable horn-carrier mounted centrally with respect to the machine.

2. A talking-machine comprising a horn-carrier rotatable about the driving-axle of the machine.

3. A talking-machine comprising a housing, a horn, a holder and a driving-axle, said holder being rotatable about the driving-axle of the machine to enable the horn to be directed toward various points without disturbing the housing.

4. A talking-machine comprising a housing or cabinet, a horn, a holder or carrier for the horn, and a driving-axle releasably geared to the holder for rotating or adjusting the direction of the same without disturbing the housing.

5. The combination with a disk graphophone, of a horn-support adjustable circumferentially in respect to the disk.

6. The combination with a disk graphophone, of a horn-support rotatable around the disk.

7. The combination with a disk graphophone, of a rotatable horn-support concentrically journaled in respect to the axis of the disk.

In testimony whereof we have hereunto

set our hands in the presence of two subscribing witnesses.

FRITZ LOCHMANN.
WILLIAM LOCHMANN

Witnesses:

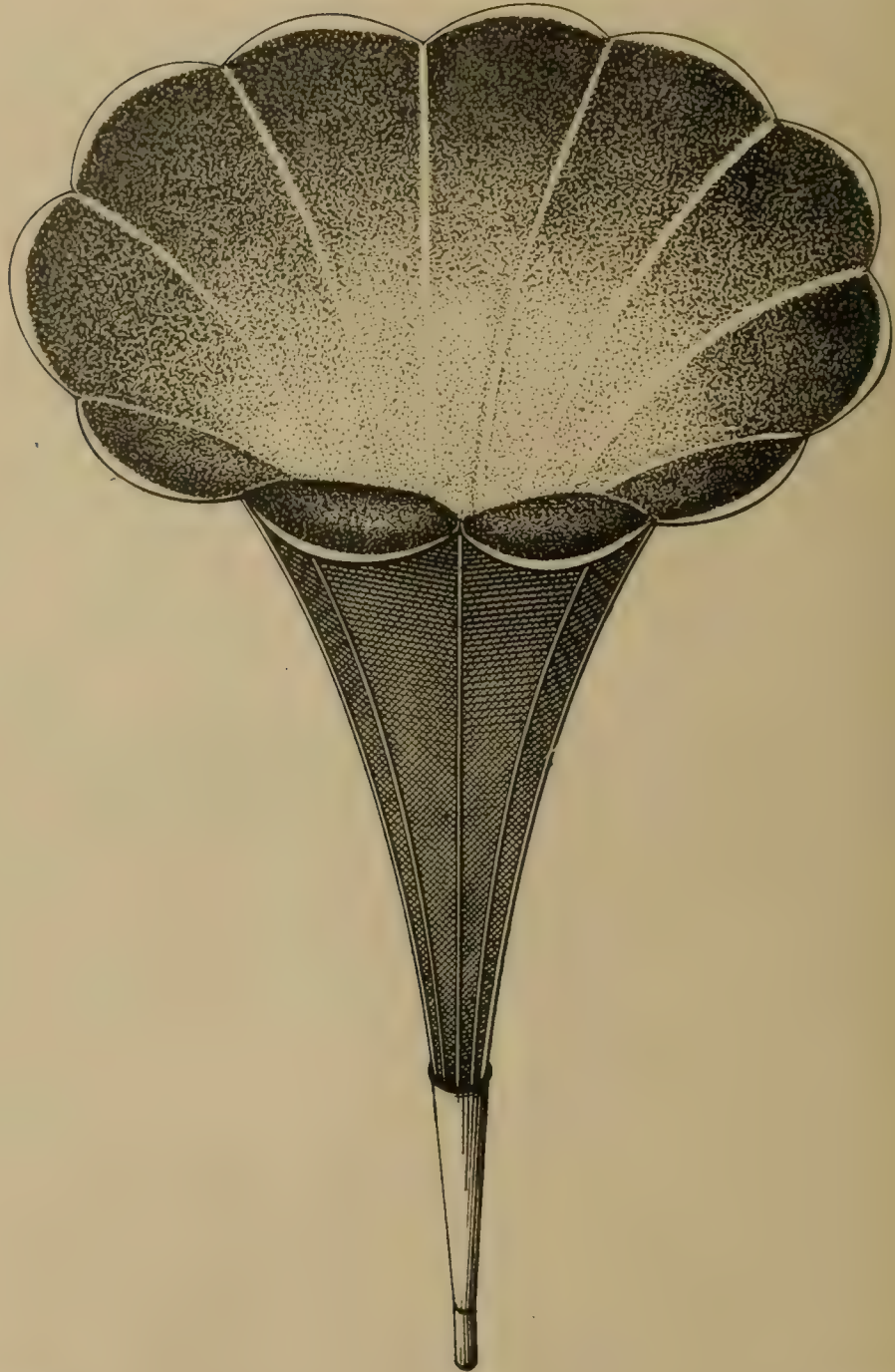
HANS NEUER,
GUSTAV MÜLLER.

DESIGN.

No. 38,106.

PATENTED JUNE 26, 1906.

H. SHEBLE.
HORN FOR TALKING MACHINES.
APPLICATION FILED JAN. 3, 1906.



Witnesses:
Titus V. Irons.
Augustus B. Coppes

Inventor:
Horace Sheble.
by his Attorneys,
Howan & Howan

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
HAWTHORNE AND SHEBLE MANUFACTURING COMPANY, OF PHILA-
DELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DESIGN FOR A HORN FOR TALKING-MACHINES.

No. 38,106.

Specification for Design.

Patented June 26, 1906.

Application filed January 9, 1905. Serial No. 240,361. Term of patent 7 years.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a certain new, original, and ornamental Design for a Horn for Talking-Machines, of which the following is a specification.

The figure shown in the accompanying drawing is a perspective view of a talking-machine horn, showing my new design.

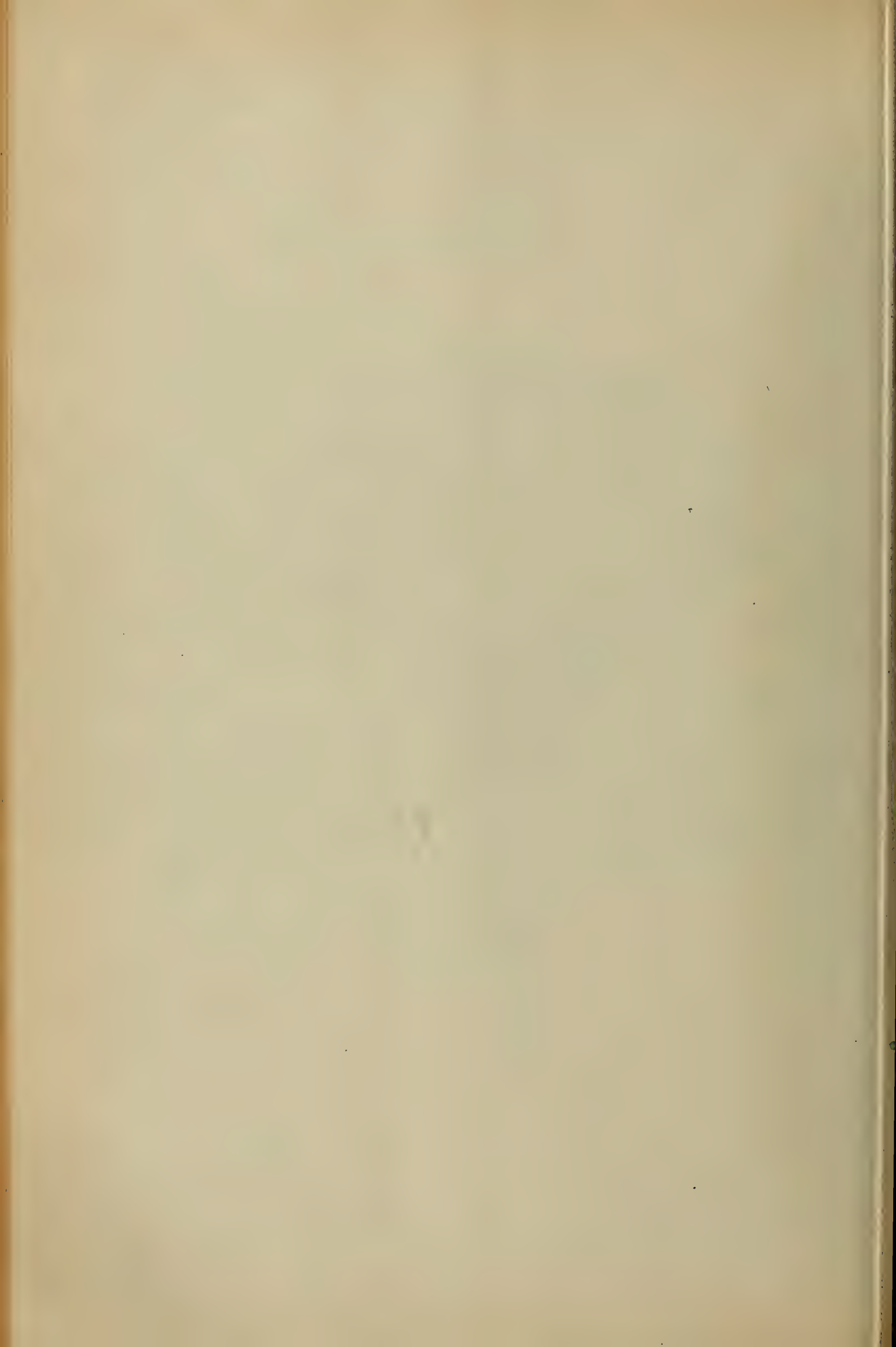
I claim—

The ornamental design for a horn for talking-machines, as shown.

HORACE SHEBLE.

Witnesses:

WILLIAM F. BENTON,
WALTER CHISM.



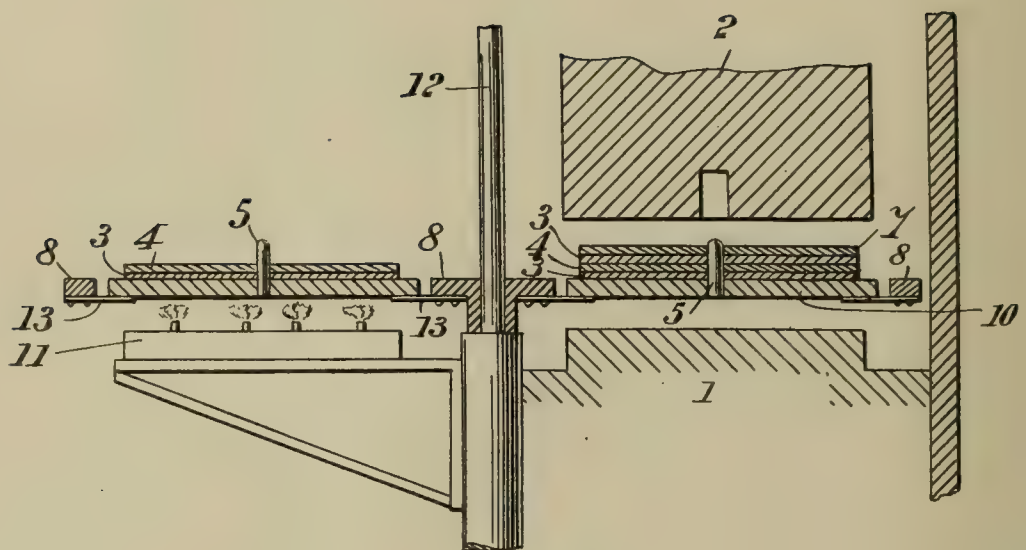
No. 824,710.

PATENTED JULY 3, 1906.

E. DESGRANDCHAMPS.

MULTIPLE DUPLICATING APPARATUS FOR SOUND PRODUCING RECORDS.

APPLICATION FILED JULY 22, 1905.



Witnesses:

L. E. Backley
W. E. Lawson

Inventor.

Emile Desgrandchamps.
& Frank S. Appleman
Attorney.

UNITED STATES PATENT OFFICE.

EMILE DESGRANDCHAMPS, OF PARIS, FRANCE.

MULTIPLE DUPLICATING APPARATUS FOR SOUND-PRODUCING RECORDS.

No. 824,710.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed July 22, 1905. Serial No. 270,867.

To all whom it may concern:

Be it known that I, EMILE DESGRANDCHAMPS, a citizen of the French Republic, and a resident of Paris, France, have invented certain new and useful Improvements in Multiple Duplicating Apparatus for Sound-Producing Records, of which the following is a specification.

This invention relates to the manufacture of plate or disk records for graphophones; and its object is the impression of such plate-records for sound-producing instruments, which records are made of hard but elastic material when in a cold state and which softens when heated, the impression of these plates being performed by means of a press provided with a movable device or a turntable carrying the disk and which allows simultaneously or not the heating of the disks or of the material previously to the compression or to the cooling of the disks or the corresponding plates, disk, and the like during or after the compression.

The annexed drawing given by way of example shows a vertical section of a special form of this press.

A table 8, which may be rotated round a vertical shaft, carries, by means of springs 13, plate-forms 10, which may be lowered by the action of the pressure and rest upon the lower plate-form 1 of the press, which is cooled by circulating water or in any other preferred manner, as well as the plate 2 of the press, which is movable. The plate-form 10, carrying a die or electroblock 3, has previously been heated over burners 11 or otherwise. Afterward the rotation of the movable table 8 carries under the plate-form of the press the previously-heated die, as well as the plate 4 to be impressed, upon which is arranged a second also previously-heated die 3 and an auxiliary plate 7, which is compressible and made of felt, asbestos, tin, zinc, and the like if the impression is to be obtained on both sides at a time or simply the compressible plate if the impression is only to be done on the under side of the disk-record. This compressible plate 7 may also be previously heated if the nature of the disk to be impressed requires that. It may also be wedged up under the movable plate 2. Then different superposed plates may be kept in place by a cen-

tering-pin 5 or by the walls of a kind of mold. The turn-table may be composed of a plurality of disks 10, so that while one die is under pressure another one is heated and a third one cooled. A press of this kind permits any loss of time to be avoided, as simultaneously one disk-record may be under pressure while another die intended to receive the pressure is heated and while a third disk-record which has just been compressed may be separated from its cooled die.

The compressible plates 7 are intended to render the pressure uniform on the whole area of the pressed surface and to control the cooling, which is very useful, as the materials which are hard and elastic at ordinary temperature generally soften but difficultly when hot and as the cooling under pressure rapidly leads to the limit temperature at which the plasticity ceases and the elasticity begins.

It has been noticed that with plate-records made of hard and elastic material a sapphire or glass point would be very convenient for producing purposes even if the record has been made by sinuosities, (record of a gramophone.) The points need not be changed after each reproduction and the record wears very little, as the spiral of the record is even polished by the successive passages of the point. Besides this, the obtained disk-records are practically unbreakable. They may be homogeneous if the thickness of the elastic material is sufficient to allow the impressed layer to remain plane without the aid of a layer of any material (cardboard and the like) upon which it is usually mounted.

Having now fully described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device of the character described the combination with a heat source and press, a rotatable table acting in conjunction therewith, said table being provided with a plurality of matrix-plate holders yieldingly mounted upon a rotatable table and a securing means carried by each of the plates.

2. In a device of the character described, in combination with a heat source and a press, a rotatable table acting in conjunction therewith, said table being provided with a plurality of compressible plate-forms.

3. In a device of the character described,

the combination with a heat source and a press, a rotatable table acting in conjunction therewith and a series of matrix-plate holders yieldingly mounted upon a rotatable table
5 arranged within the table.

4. In a device of the character described, in combination with a heat source and a press, a rotatable table acting in conjunction there-

with, plate-forms, and springs for securing the forms to the table.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

EMILE DESGRANDCHAMPS.

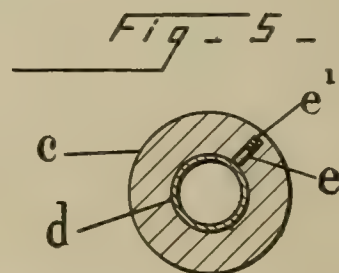
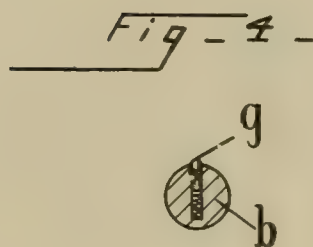
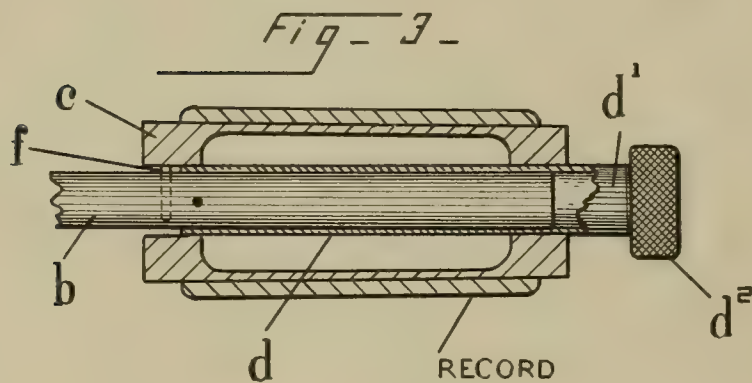
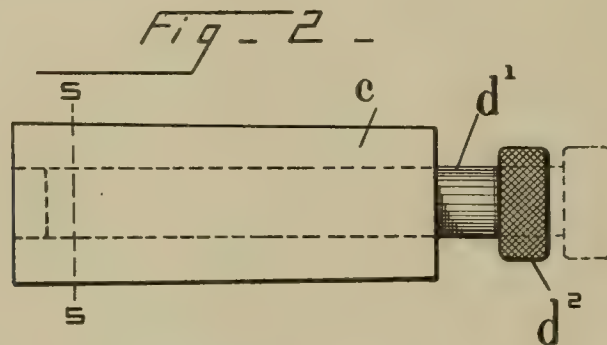
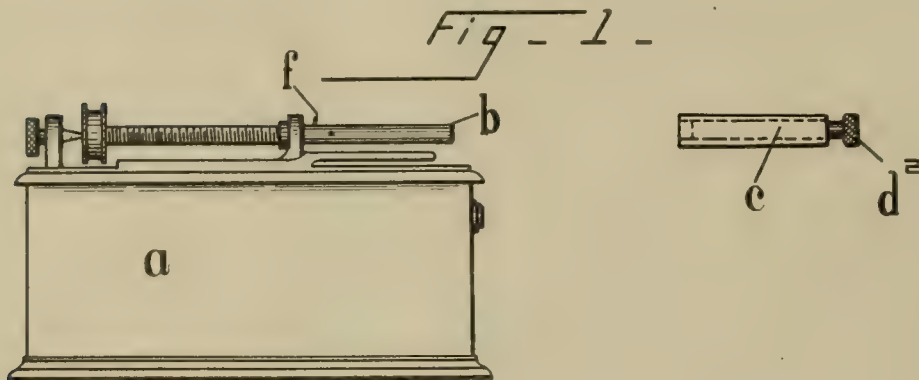
Witnesses:

ADOLPH STURM,
HANSON C. COXE.

No. 825,045.

PATENTED JULY 3, 1906.

W. H. GATES.
MANDREL FOR PHONOGRAPHIC RECORDS.
APPLICATION FILED MAR. 30, 1905.



William H. Gates, Inventor,

Witnesses
Frank S. Devere.
May F. Ritchie.

Frank H. Allen
by Attorney

UNITED STATES PATENT OFFICE.

WILLIAM H. GATES, OF NORWICH, CONNECTICUT.

MANDREL FOR PHONOGRAPHIC RECORDS.

No. 825,045.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed March 30, 1905. Serial No. 252,839.

To all whom it may concern:

Be it known that I, WILLIAM H. GATES, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Mandrels for Phonographic Records, of which the following is a specification.

This invention relates to record-supporting mandrels for use with talking-machines, my immediate object being to provide a removable mandrel in which provision is made for adjusting the record longitudinally relatively to the said mandrel.

Heretofore, so far as I am familiar with the art to which my present invention relates, it has been the universal practice to provide in talking-machines using cylindrical records a slightly tapering mandrel that is fixedly secured to or formed as an integral part of the screw-shaft that operates the traveler upon which the reproducer is mounted. The cylindrical record is slipped upon said mandrel until it fits the same snugly, no provision being made for adjusting the record lengthwise. As I have stated above, my present invention provides for such adjustment, and thus makes it possible to so position the record with respect to the reproducer that the latter will be started into action sooner or later, as may be desired—that is to say, the record may be readily and accurately positioned so that the reproducer will engage it at any point throughout the length of said record and will begin speaking at that particular point. In addition to this desirable result my present invention also anticipates the provision of automatic means for transferring records one at a time from a relay or magazine of records to the mandrel of talking-machines of this class and for removing said records after they have been used, my present improved form of mandrel being specially adapted for use with such automatic mechanism.

My said invention is illustrated in the accompanying drawings.

Figure 1 is a side elevation of a phonograph-case having mounted thereon the shaft which ordinarily receives the cylindrical record. The other operative parts of the machine are not shown, as they bear no immediate relation to my present invention. In this figure one of my newly-invented record-supporting cylinders is also shown in position to be slipped upon the said shaft. Fig.

2 is a relatively enlarged side view of a mandrel embodying the essential features of my present invention, and Fig. 3 is a longitudinal central sectional view of said mandrel, showing also a "record" mounted thereon, as well as a portion of the shaft above referred to. Fig. 4 is a transverse sectional view of said shaft at the point where it is intersected by a certain friction-plug *g*. Fig. 5 is a transverse sectional view of the mandrel, taken on the line 5 5 of Fig. 2.

Referring to the drawings, the letter *a* indicates a phonograph-case, and *b* the record-supporting shaft revolubly mounted in suitable journal-bearings on said case and in such manner that an extended overhanging end portion of the shaft is provided, as shown. Ordinarily a slightly conical cylindrical mandrel of proper size to receive a record is fixedly secured upon or formed as a part of the extended end portion of shaft *b*; but in my present invention I provide a readily-removable mandrel *c*, that is adjustably mounted upon a tubular core *d*, one of whose ends is extended, as at *d'*, and is preferably formed with an operating head or handle *d''*. The mandrel *c* is adapted to slide freely upon the core *d*, but is held against accidental or unintentional displacement by a frictionally-acting stud *e*, mounted in the mandrel *c*, and is held, as here shown, in contact with the perimeter of the core *d* by a spiral spring *e'*.

The shaft *b* has fixed therein a stud *f*, that serves as a stop to position the core *d* on said shaft, and I also provide in said shaft a spring-pressed friction-stud *g*, that serves to prevent the accidental displacement of the core on the shaft when the parts are assembled for use.

When it is desired to utilize my described invention, a record is slipped tightly upon the mandrel *c*, as seen in Fig. 3 of the annexed drawings. The tubular core *d* is then slipped upon the shaft *b* until it abuts and is stopped by the stud *f*. The mandrel *c* may then be slid lengthwise upon said core until the record is so positioned with respect to the reproducer that the stylus of the latter will engage the record at the desired point. Thus it will be seen that by suitably adjusting the mandrel the machine will commence to speak at the beginning of a piece or at any desired point in said piece, and when the reproducer is again moved back to its starting position (to repeat) it will always engage the record at the same point

Having thus described my invention, I claim—

1. A holder for talking-machine records, comprising a cylindrical non-tapered mandrel, a tubular cylindrical non-tapered core upon which said mandrel is readily adjustable, and extended and having one end closed and formed with an integral operating-handle, and a shaft having one end received in said tubular part, said mandrel and tubular part being capable of dual adjustment for the purposes stated.

2. A holder for talking-machine records, consisting of a cylindrical non-tapered mandrel, and an internal, tubular, support therefor; said support being adjustable on its shaft and mandrel being adjustable, longitudinally, relatively to said support, said tubular support being extended to provide a handle substantially as specified.

3. In combination with the record-bearing shaft of a talking-machine, a cylindrical non-tapered record-holder, and a tubular non-tapered support interposed between the said holder and shaft, said interposed sup-

port having extended integral operating-handle and being longitudinally adjustable relatively to both the holder and shaft.

4. In a device of the character stated, a shaft having a stop-stud and a spring-actuated friction-stud, a cylindrical mandrel, and a tubular internal adjustable support for said mandrel, said support and mandrel being independently adjustable.

5. In a device of the character stated, a shaft having a stop-stud and a spring-actuated friction-stud, a cylindrical mandrel, and a tubular internal adjustable support for said mandrel, said support and mandrel being independently adjustable and a spring-actuated friction-stud in the mandrel to engage the perimeter of said tubular support.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. GATES.

Witnesses:

FRANK H. ALLEN,
MAY F. RITCHIE.

No. 825,065.

PATENTED JULY 3, 1906.

A. MAÎTRE.
SOUND REPRODUCING DISK FOR GRAMOPHONES.
APPLICATION FILED APR. 18, 1905.

FIG. 1.

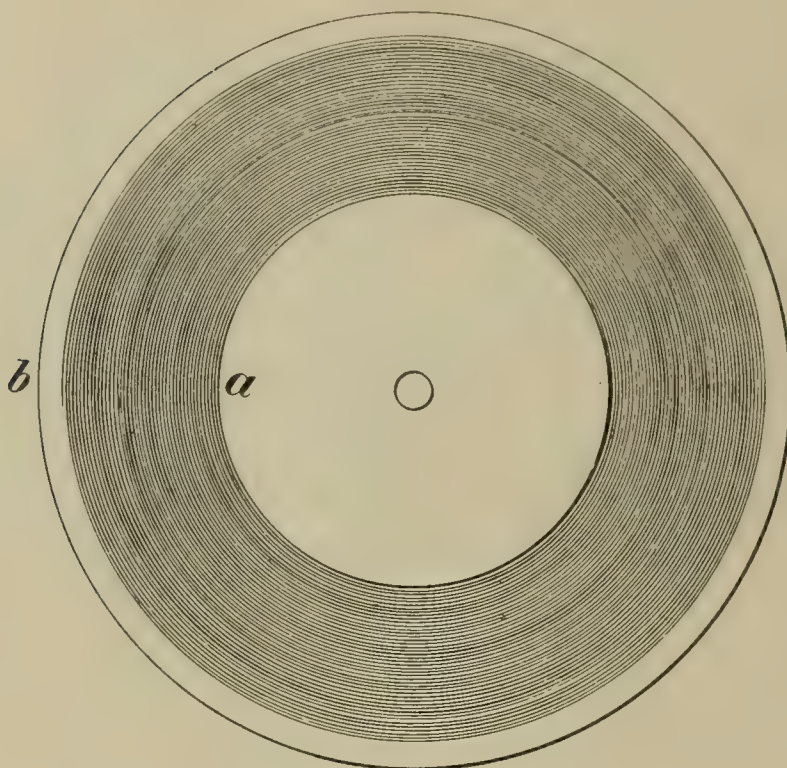


FIG. 2.



WITNESSES:

Fred White
Rene' P. Munn

INVENTOR:

Achille Maître,

By his Attorneys

Arthur C. Fraser & Co.

UNITED STATES PATENT OFFICE.

ACHILLE MAÎTRE, OF DÉLEMONT, SWITZERLAND.

SOUND-REPRODUCING DISK FOR GRAMOPHONES.

No. 825,065.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed April 18, 1905. Serial No. 256,219.

To all whom it may concern:

Be it known that I, ACHILLE MAÎTRE, a citizen of the Swiss Republic, and a resident of Délemont, Jura Bernois, Switzerland, have
5 invented certain new and useful Improvements in the Sound-Reproducing Disks for Gramophones, of which the following is a true, full, and complete specification.

The distinguishing feature of this invention
10 consists in that the sound-reproducing disk has each of its two faces constructed as a spirally-grooved working surface in the form of a truncated cone.

A first object which is attained by this
15 special formation of the disk-faces is to enable the disk to be used on each of its two faces, with the effect of enabling the receiving-stylus to follow more easily the spiral grooves, owing to the inclination of the grooved parts, and at
20 the same time to diminish the friction thereof, because the declivity or inclination of the grooved working faces of the disk aids somewhat in the motion of the receiving-stylus.

Another great advantage of this double-
25 cone disk consists in that the latter has in its middle portion relatively great thickness, so that it is very solid and resists well breaking and bending strains, during its manipulation or under other influences.

30 In the accompanying drawings, Figure 1 represents by way of example the preferred form of the improved disk in plan view, and Fig. 2 is an elevation of the same viewed edgewise.

In the construction shown the disk is provided upon both faces with spiral grooves
35 for the purpose of reproducing two airs, these faces being inclined to form each a working surface in the form of a truncated cone. This inclination of both the disk-faces is arranged
40 in such a manner that the thickness of the disk in its grooved part diminishes gradually from the point *a* to the periphery *b*, whereby the disk possesses in its middle portion a relatively great thickness. For both working
45 faces of the disk the reproducing-stylus will travel from the inner end of the spiral to its outer end.

The disk of my invention is intended to be mounted upon a stationary shaft which can
50 only perform rotary motion around its geometric axis.

What I claim is—

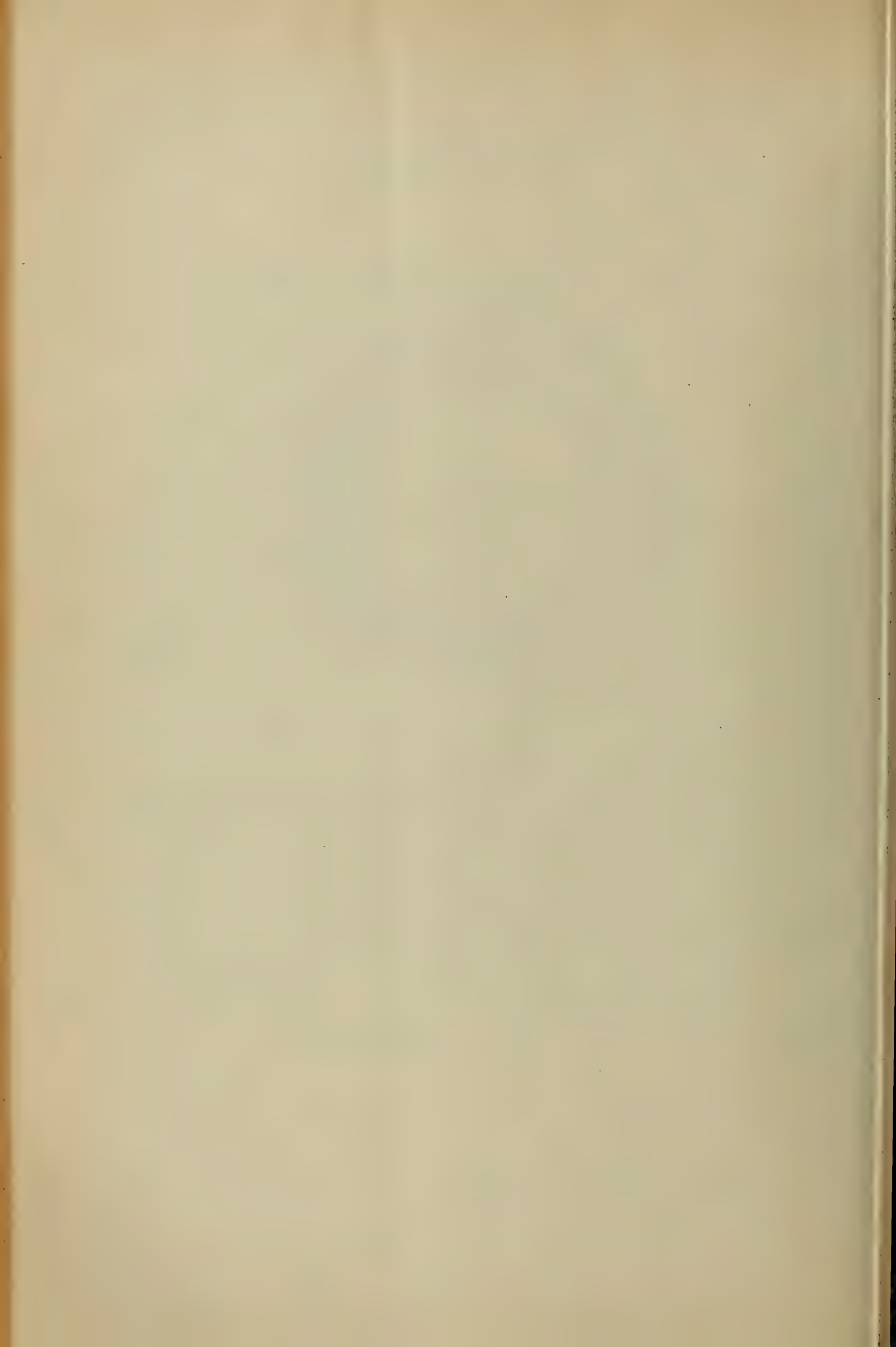
An improved sound-reproducing disk for gramophones, having each of its two faces
55 constructed as a spirally-grooved working surface in the form of a truncated cone, the thickest portion of the disk being at the center and the thickness diminishing toward the periphery, so as to provide a maximum
60 strength and stiffness.

In witness whereof I have hereunto signed my name, this 4th day of April, 1905, in the presence of two subscribing witnesses.

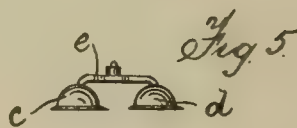
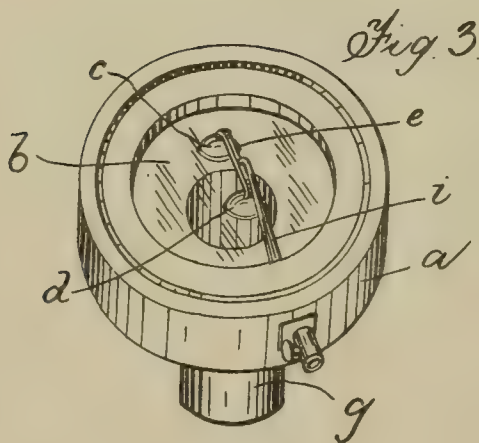
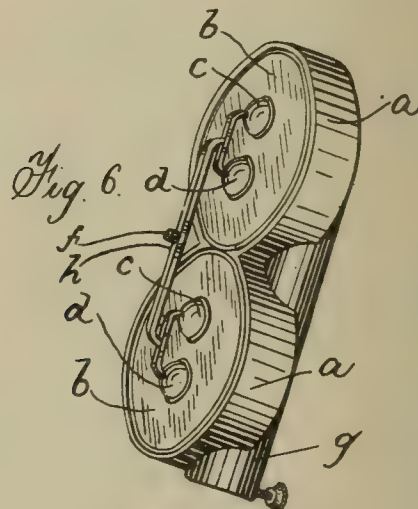
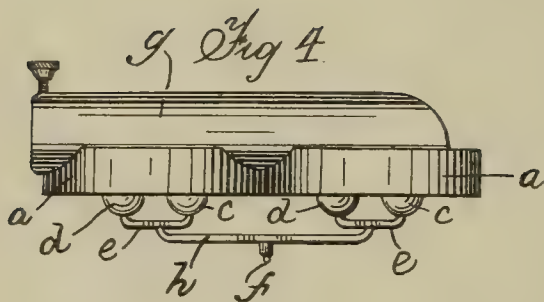
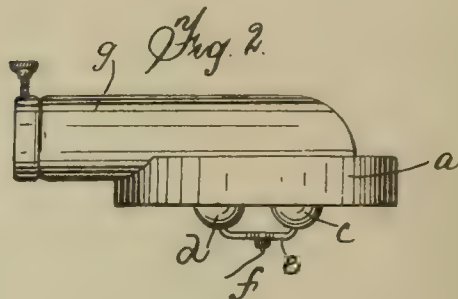
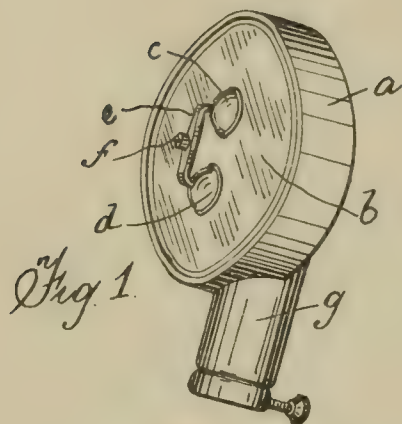
ACHILLE MAÎTRE.

Witnesses:

GEO. GRIFFORD,
AMAND BRAUN.



A. FISCHER.
SOUND BOX OF PHONOGRAPHS.
APPLICATION FILED MAR. 14, 1905.



Witness
Stephen Hinton
W. Max. Dwall.

Inventor
A. Fischer
By Wilson & Fisher
his Attorneys.

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

SOUND-BOX OF PHONOGRAPHS.

No. 825,119.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed March 14, 1905. Serial No. 250,108.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 18 Hazlitt road, Kensington, London, England, have invented certain new and useful Improvements in or Relating to Sound-Boxes of Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the sound-boxes of phonographs—that is, instruments by which the mechanical effect of vibrations of sound can be recorded on a suitable moving surface, such as a cylinder or disk, and reproduced from such surface.

The invention has for its object the reduction of the over and false vibration of the diaphragm of the reproducing and recording sound-boxes. To this end I divide the diameter of the diaphragm into about thirds by placing on each of the two points of division a dome or bearing-piece. The two domes or bearing-pieces carry and are directly connected to a common stylus-bar carrying (preferably at its middle) the stylus. The domes or bearing-pieces and the common stylus-bar carried by them lie in a direct line with the longitudinal axis of the sound-box connection or sound-exit tube. In the case of disk-machines or gramophones I connect the bridge to the diaphragm of the sound-box at two points (the points of division dividing the diameter or axis into about thirds) over one another in a line with the stylus-bar. The connecting-pieces may go through the diaphragm in the usual way, the stylus being at the lower end of the stylus-bar. By preference two sound-collecting holes are employed, situated under the division-points of the diaphragm and leading into the sound-exit tube for either cylinder or disk machines. I have also applied this arrangement with success to two independent sound-boxes which are placed in front of one another across the record for cylinder-machines and on the top of one another for disk-machines. These independent sound-boxes are directly connected together through a common stylus-bar and a common exit-tube and have one common reproducing-stylus.

In order that my invention may be better understood, I will proceed to describe the

same with reference to the drawings accompanying this specification, in which—

Figure 1 shows perspective view of sound-box. Fig. 2 shows elevation of same. Fig. 3 shows perspective view of sound-box for that description of phonograph known as the “gramophone.” Figs. 4 and 6 show a method of applying my invention to two independent sound-boxes. Fig. 5 shows a detail herein-after referred to.

The same letters of reference are employed to denote the same parts in all the views.

a shows ordinary sound-box provided with diaphragm *b*, upon which are mounted two domes *c d* as bearing-pieces, carrying a bridge *e*, made of metal or other suitable material. In the middle of this bridge is fixed the stylus *f*, which may be an ordinary stylus. I find in practice that the best position for the domes *c d* is about one-third of the diameter from the edges of the sound-box.

The bridge and domes are shown detached in elevation at Fig. 5. These domes may be round oblong elliptical “spiders” or of any other suitable form.

With reference to Fig. 4 it will be seen that I provide two sound-boxes each of which communicates with the tube *g*, and these sound-boxes are each provided with the domes and bridge, as in the case of a single sound-box. The two bridges are connected toward their middles by means of a secondary bridge *h*, carrying at its middle a reproducing or recording stylus.

With reference to the application of my invention to disk machines or gramophones it will be seen at Fig. 3 that I apply my bridge and domes in a similar manner to that already described, and I preferably connect to the middle of the bridge *e* the bar *i*, which bar carries on its lower end the needle or stylus.

Although I have shown the bridge *e* mounted on domes, I do not wish to limit myself to this particular method, as it may be found advantageous to attach the stylus bar or bridge direct onto the diaphragm by a flange or otherwise. In the case of disk machines I may employ connections, screws, or the like which pass through the diaphragm in the ordinary way to attach the bridge thereto, or the bridge may be otherwise suitably connected to the diaphragm at two points.

It may be advantageous to make the sound-

box and diaphragm of an oblong, elliptical, or other suitable form instead of round, as shown in the drawings.

5 It will be observed that the bridge or common stylus-bar lies in a direct line with the longitudinal axis of the sound-box connection or sound-exit tube in the case of a cylinder-machine or along the stylus-bar in the case of a sound-box for a disk machine.

10 It is obvious that the same principle may be applied to recorders by substituting for the reproducing-stylus a cutting-stylus.

15 By making sound-boxes as herein described reproduction is found to be much clearer than when the stylus is simply fixed onto the center of the diaphragm.

What I claim, and desire to secure by Letters Patent of the United States of America, is—

20 1. A sound-box comprising the box proper and a diaphragm with a sound-tube arranged parallel to the plane of the diaphragm, a bridge connected to said diaphragm at two or more points in line with said tube, and a stylus carried by said bridge, substantially as described.

25 2. A sound-box, comprising the box

proper, of elliptical or oblong shape, and a diaphragm with a sound-tube arranged parallel to the plane of the diaphragm, and a bridge connected at two or more points to said box in the direction of the axis of the sound-tube, substantially as described. 30

3. A sound-box, comprising a box provided with a sound-tube, a diaphragm, domes attached to said diaphragm, a bridge connecting said domes, and a stylus centrally mounted on said bridge, said bridge, domes and stylus being mounted on a line parallel to the sound-tube, substantially as described. 35

4. A double sound-box, comprising two separate boxes placed side by side with a sound-tube running longitudinally thereof, each box being provided with a diaphragm, domes secured to said diaphragm, a bridge connecting said domes, and a bridge carrying a stylus connected to said first-named bridges, substantially as described. 40

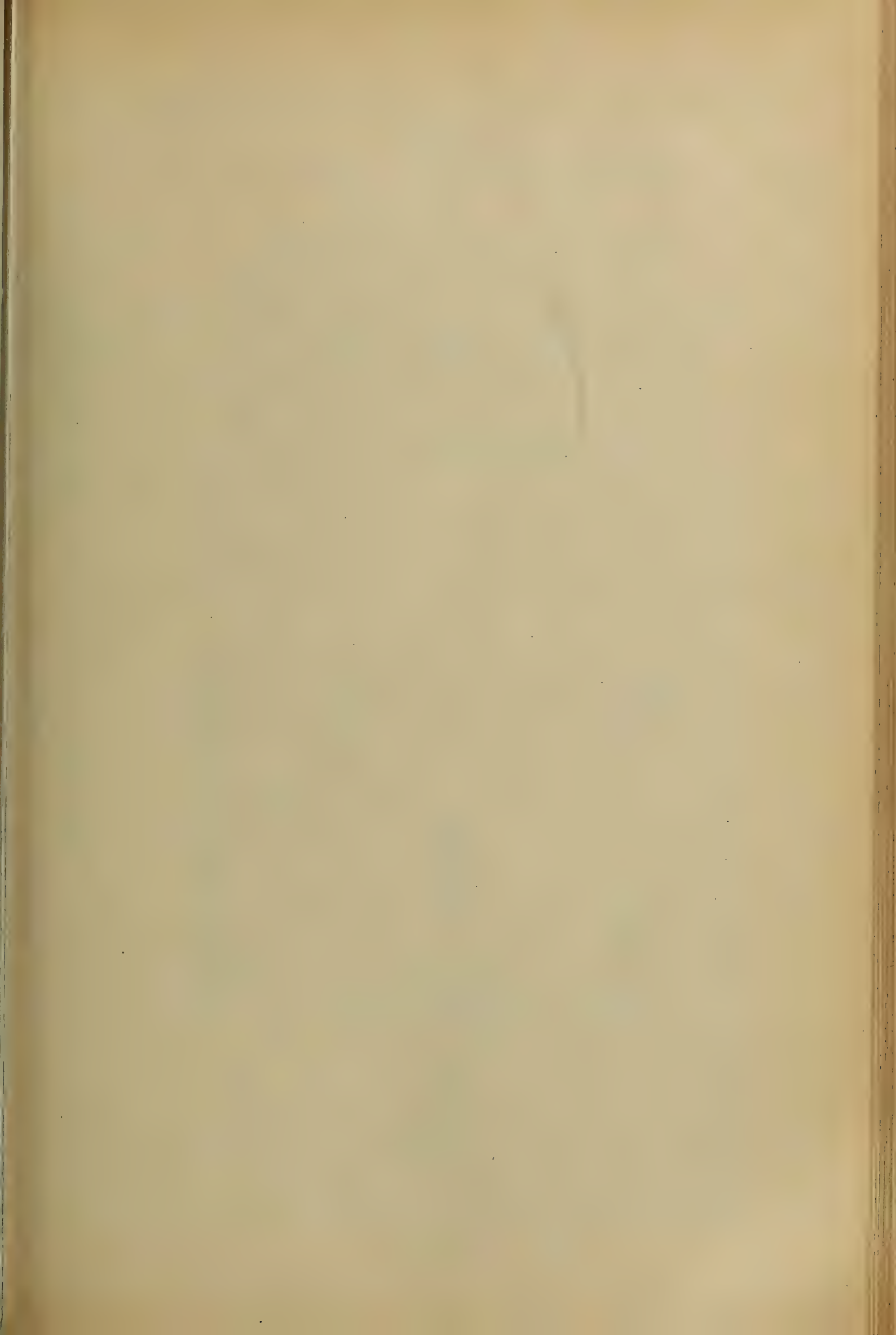
In testimony whereof I affix my signature in presence of two witnesses.

ALEX FISCHER.

Witnesses:

A. E. VIDAL,

H. D. JAMESON.

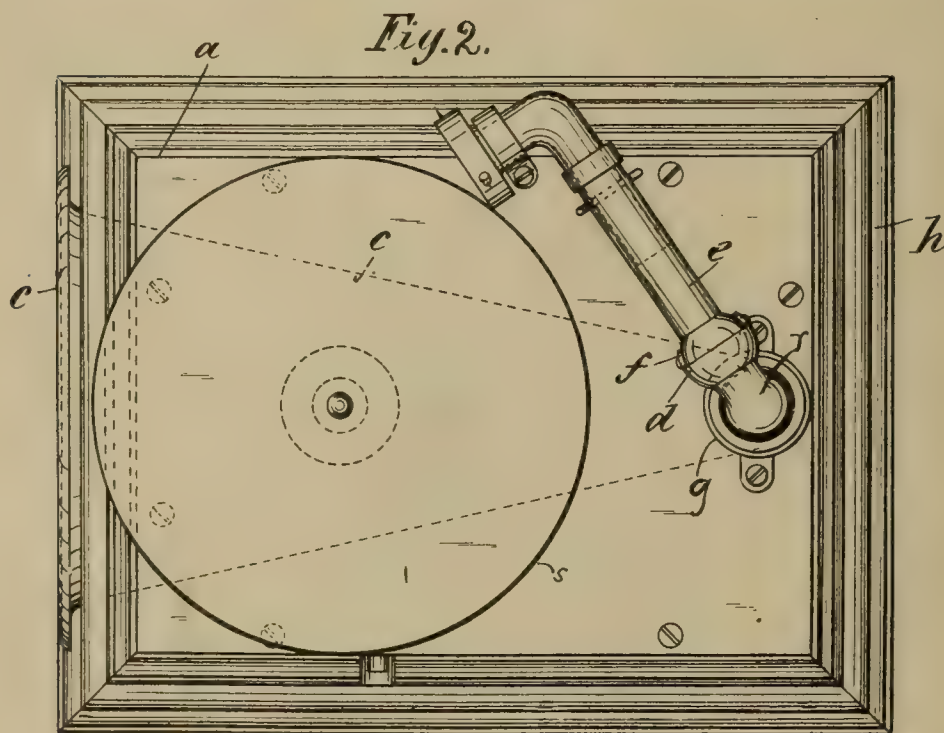
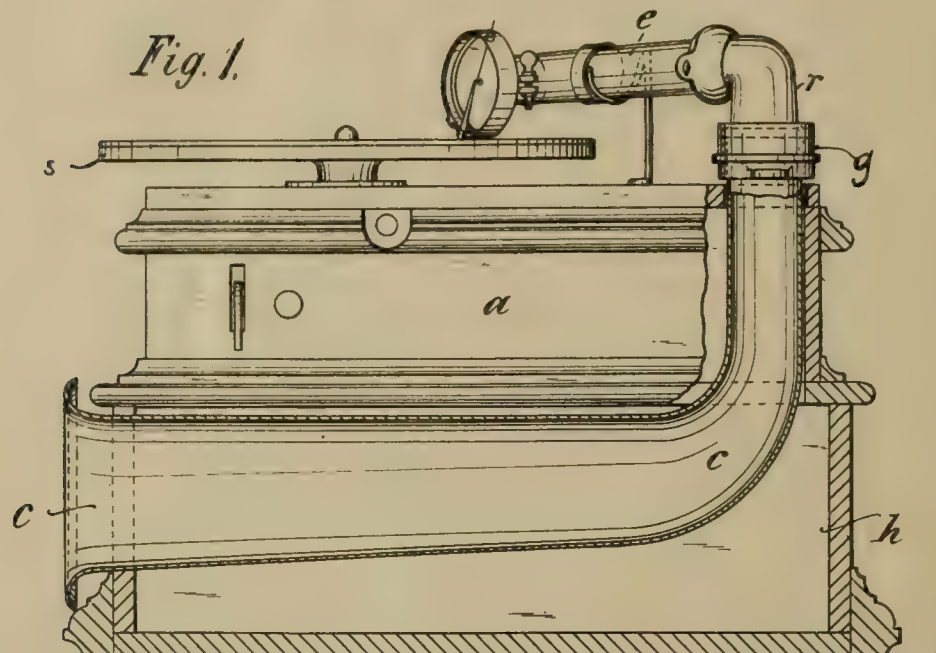


No. 825,725.

PATENTED JULY 10, 1906.

G. HENSCH.
GRAMOPHONE.

APPLICATION FILED AUG. 8, 1904.



Witnesses:

Gerhard Kisters
Alfred M. Kisters

Inventor:

Gustav Hensch
by Eustace W. Hopwood,
att'y

UNITED STATES PATENT OFFICE.

GUSTAV HENSCH, OF LEIPSIC, GERMANY, ASSIGNOR TO THE FIRM OF
ERNST HOLZWEISSIG NACHF, OF LEIPSIC, GERMANY.

GRAMOPHONE.

No. 825,725.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed August 8, 1904. Serial No. 220,007.

To all whom it may concern:

Be it known that I, GUSTAV HENSCH, a subject of the King of Prussia, German Emperor, residing at Leipsic, Saxony, Germany, have invented new and useful Improvements in Phonographs, Gramophones, and Like Instruments, of which the following is a description.

The present invention relates to phonographs and similar instruments; and its object is to locate the trumpet of these instruments so that it shall be out of the way and less subject to damage and to injury of the other parts of the instrument by being run against or unintentionally struck, as often happens when the trumpet is arranged in the exposed position common to most apparatuses of the class hitherto known.

The invention also comprises the connection of the diaphragm-arm to the end of the trumpet, so as to allow of the free movement of the latter when the trumpet is stationary.

In order to render the present specification easily intelligible, reference is had to the accompanying drawings, in which similar letters of reference denote similar parts throughout both the views.

Figure 1 is a side elevation, partly in section; and Fig. 2, a plan of the device.

The phonograph or talking-machine comprises a motor-casing *a* with record-support *s* thereon. Below the motor-casing there is a lower casing *h*, permanently attached thereto and forming a support for said motor-casing, which rests upon same. A trumpet or horn *c* is connected to a sound-conveyer *e*, carrying a reproducer, which is adapted to move across the record-support. The horn *c* is turned downwardly and around and is supported within the said lower or horn casing and has its flared end located in the open end of same. In order to reduce the height of the housing or lower casing *h* of the horn, the larger portion of said horn or trumpet passes horizontally through the said casing. The small and upper part of the horn *c* supports a ring *g*, and upon this ring is mounted an elbow *r*, the outer end of which is flared to form a socket *d* to receive the ball formed on the contiguous end of the diaphragm-arm or sound-conveyer *e*. The ball-shaped end of the sound-conveyer *e* has at each side an arm *f*, pivotally attached at the center of the

ball and having its free end pivoted to the ring *g*, which encircles the end of the horn below the flared top end of same. Thus a ball-and-socket connection is provided which permits of a vertical movement of the sound-conveyer *e*. The horizontal swinging movement of the sound-conveyer *e* is effected by rotating said conveyer about the axis of the upper end of the horn *c* by means of said arm *f* and ring *g*. In the described manner a movable connection is provided between the sound-conveyer *e* and the horn *c* which permits of a vertical and horizontal movement of the said conveyer, while the horn itself remains stationary.

The above-described arrangement and location of the trumpet enables the employment of much larger trumpets than have hitherto been employed, so that the tone of the instrument may be improved without requiring any more room for the former, as would be the case if the trumpet were located above or at the side of the casing. The location of the trumpet within the casing renders the instrument less liable to injury, and therefore few or no repairs are required, which makes the instrument less expensive during continued use. The complete apparatus occupies but little room when not in use and during transportation or storage.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A talking-machine comprising a motor-casing, a record-support thereon, a lower casing upon which said motor-casing rests, a sound-conveyer carrying a reproducer arranged to move across the record-support, a horn mounted within the lower casing and supporting said sound-conveyer and a movable connection between said sound-conveyer and horn to permit vertical and horizontal movements of said sound-conveyer.

2. A talking-machine comprising a motor-casing, a record-support thereon, a lower casing upon which said motor-casing rests, a sound-conveyer carrying a reproducer arranged to move across the record-support and having a ball-shaped end provided at each side with a downward arm pivotally attached at the center of said ball, a horn mounted within the lower casing, a ring supported by the upper part of the horn, an el-

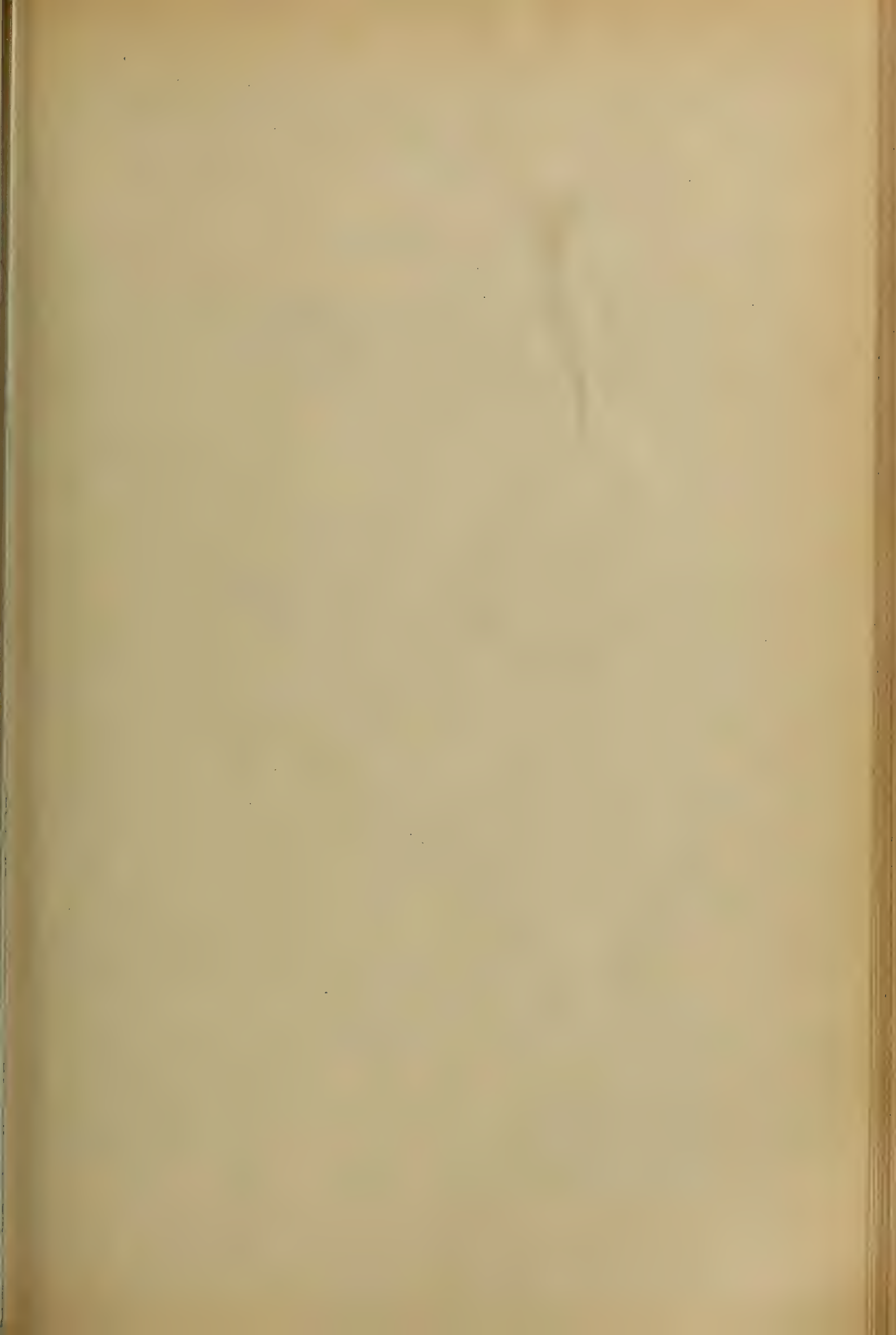
bow mounted upon the ring and having an
outer flared end to form a socket to receive
the ball formed at the end of the sound-con-
veyer whereby a movable connection is
5 formed between said sound-conveyer and
horn which permits of vertical and horizontal
movements of said conveyer.

In witness whereof I have hereunto set my
hand in presence of two witnesses.

GUSTAV HENSCH.

Witnesses:

MORITZ SPREER,
RUDOLPH FRICKE.



P. LEBIEDZINSKI.
SOUND BOX FOR PHONOGRAPHS AND THE LIKE.
APPLICATION FILED OCT. 14, 1905.

Fig. 1.

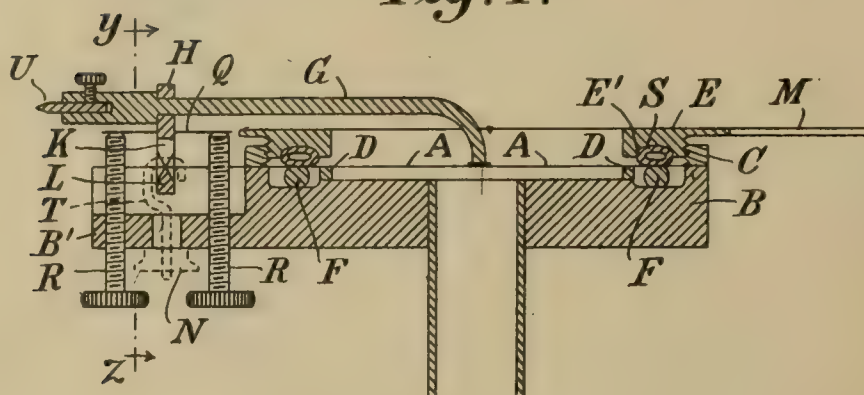


Fig. 3.

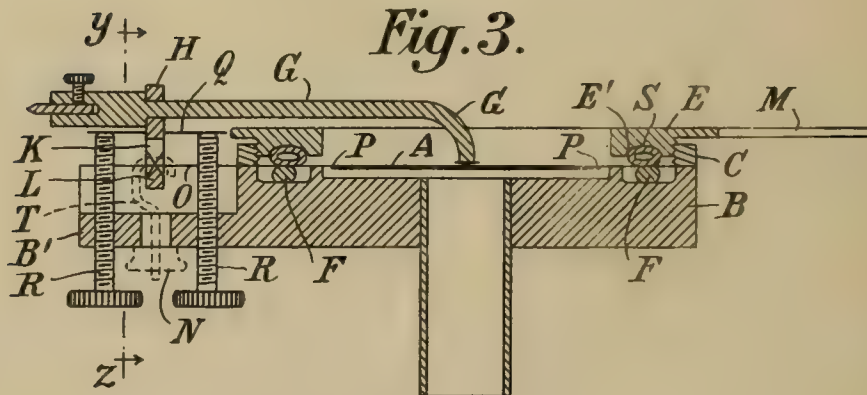


Fig. 2.

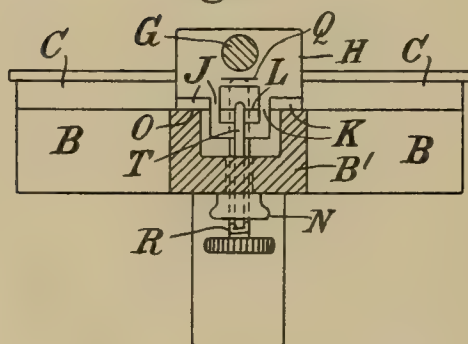


Fig. 4.

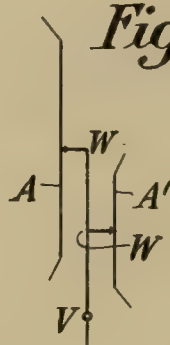
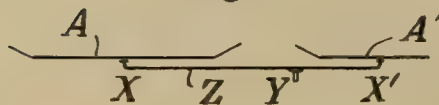


Fig. 5.



WITNESSES:

H. J. Dukerier
Elsa Newbury

INVENTOR
Piotr Lebiezinski
BY *James Grace*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

PIOTR LEBIEDZINSKI, OF WARSAW, RUSSIA.

SOUND-BOX FOR PHONOGRAPHS AND THE LIKE.

No. 825,738.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed October 14, 1905. Serial No. 282,704.

To all whom it may concern:

Be it known that I, PIOTR LEBIEDZINSKI, a subject of the Emperor of Russia, residing at Warsaw, Russian Poland, in the Empire of Russia, have invented a new and useful Sound-Box for Phonographs, Telephones, and the Like, of which the following is a specification.

The capacity of a diaphragm for recording or reproducing sounds of a varying pitch in the proper strength and tone color chiefly depends upon its pitch or tone, and each pitch or tone of the diaphragm comprises only a certain progression of notes which may be recorded or reproduced approximately correctly. A lowly-keyed diaphragm will always reproduce the low notes in a louder and more natural manner than the high notes, which in a so-keyed diaphragm are feeble and have an unnatural color, while, on the contrary, a highly-tuned diaphragm will reproduce the high notes in a louder fashion and in a more correct tonality than the low notes, which in a so-keyed diaphragm are weaker and unnatural. In short, each diaphragm in accordance with its pitch will vary that proportion between the overtones and the fundamental which determines the color of the notes, so that also the true reproduction and strength of the tones will be more or less influenced.

In order to satisfy as much as possible all the requirements, the diaphragms used in phonographs, gramophones, telephones, &c., are usually tuned to a mean succession of sounds, although the above-mentioned defects will remain unaltered at both ends of the scale. Thus, for example, the notes of the violin when reproduced will always resemble those of the flute or the whistles and the notes of a trumpet or the piano-bass notes will resemble cries, they being without depth and strength, while only the intermediate notes between certain limits, the pitch of which is in accordance with that of the diaphragm, will be reproduced comparatively truly and in the correct strength. The same is true of the recording-diaphragms which are not uniformly sensitive for all notes, and therefore will record the several sounds only in correspondence with its pitch and not always in a manner true to nature. Now that the musical scale comprises at least seven octaves, (certain overtones of the several notes remaining still without these limits,) but the capacity of the diaphragm

comprises only about two octaves, it follows that the diaphragm will have to satisfy other conditions in order to be able to correctly reproduce or record every sound or note possible. First of all, the diaphragm requires to have a pitch that may vary within very wide limits, and, secondly, the diaphragm requires to be combined with devices by means of which its pitch may be varied, not only when at rest, but also when working—that is, during the recording or reproducing operation. In other words, the diaphragm requires to be capable of accommodation in a similar manner as the eye or the ear.

The object of this invention is to provide a diaphragm which will record or reproduce accurately and distinctly tones of widely-varying pitch and be adaptable during operation to a tuning adjustment. To this end the diaphragm comprises a central portion composed of a hard material and an outer portion of an extremely-flexible fibrous material adapted to stretch radially to change the tension of the diaphragm.

I will now proceed to describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a longitudinal central section through a sound-box. Fig. 2 is a cross-section through the line $y z$ in Figs. 1 and 3. Fig. 3 is a section similar to Fig. 1, in which the diaphragm is modified. Fig. 4 shows diagrammatically the arrangement of two different diaphragms with a common stylus-lever, and Fig. 5 shows diagrammatically the arrangement of two different diaphragms with a common stylus-carrier.

Similar letters of reference refer to similar parts throughout the several views.

In Fig. 1, A denotes a diaphragm clamped at its periphery between the border or outer rib b of a sound-box B and a ring C, which latter is secured on the box B by means of screws (not shown) or the like. The diaphragm A may be placed in direct contact with the parts B and C or between annular washers of india-rubber, cork, or the like on the border of the box B and on the ring C, so as to enable the diaphragm A to move between elastic bodies. The clamping-ring C is provided with an internal screw-thread, into which the external thread of a clamping ring or bezel E engages. The latter is arranged to press on the diaphragm A, either direct or by means of an annular insertion, so as to more or

less stretch the diaphragm in all radial directions, whereby the pitch of the diaphragm is adjusted. The annular insertion when used is best made hollow, as S in Fig. 1, which insertion is embedded in an annular groove E' of the clamping-ring E and bears on the diaphragm A. The cavity of the elastic tube S may be filled with compressed air or with a liquid, so that a pressure may be thereby produced for acting upon the diaphragm A. Where so preferred, the endless elastic tube S may be connected with a suitable device without the sound-box by means of a hose or tube, so that by actuating the device the elastic tube S, filled with air or a liquid, may be inflated to increase its pressure upon the diaphragm A. Beneath the diaphragm A an air-space is formed by a concentric stretching-ring D, on which the former rests. According to the material from which the diaphragm is made this ring D may be elastic or inelastic. In the latter case the ring D may be made in one piece with the box B. In the annular space beneath the diaphragm A and between the border b of the box B and the ring D an elastic ring F is disposed, which serves for raising the diaphragm toward the clamping-ring E when the latter is unscrewed. The ring E may be turned direct with one's fingers or by means of an arm M, made in one piece with the ring E. This lever M may be turned by one's fingers or it may be actuated by means of a suitable mechanism or a pneumatic, hydraulic, or electromagnetic device in order to adjust the diaphragm A without any shocks.

In case the clamping-ring E is made to bear direct on the diaphragm it may be provided with a sharp circular edge, which acts upon the diaphragm A in a circle between the stretching-ring D and the border of the box B for stretching the diaphragm. Thus the latter can be tuned at pleasure and during the working. The endless elastic tube S, filled with compressed air or a liquid, can be made to bear upon the diaphragm A to stretch it by merely turning the ring E or its arm M through a corresponding angle. Instead of adjusting the clamping-ring E the device mentioned above, which is connected with the endless elastic tube S by means of a hose or the like, may be actuated for inflating the tube S. The elastic tube S will be found to be specially useful for adjusting the diaphragm during its work.

The stylus-lever G is fastened with its one end on the diaphragm A in the center of the latter, as usual. It is to be noted that at its fulcrum the stylus-lever G requires to be connected with the sound-box in a safe manner, and at the same time it must be possible to strain at will the stylus-lever G and therewith also the diaphragm A. This is effected in the following manner: Near its other end the stylus-lever G is rigidly connected with a

slotted plate H at right angles to it. This slotted plate H has the shape shown at Fig. 2, and its two external edges J and K and its internal edge L in the slot are in the same straight line and are oppositely-beveled off to form sharp edges. The box B is provided with a recessed projection B', (see Fig. 2,) into the recess of which the projecting part of the plate H engages. A hook T (shown in dotted lines) engages in the slot of the plate H and is secured by means of a nut N, whereby the two external sharp edges J and K of the plates H are pressed on the corresponding faces O O of the projection B', which faces are in the plane of the diaphragm A. Thus the stylus-lever G is pivotally connected with the box B, while being at full liberty to rock. It is possible to adjust the pressure of the hook T upon the sharp edge L by means of the nut N without producing any strain in the stylus-lever G. A leaf-spring Q passes through the plate H and is therein secured parallel to the stylus-lever G. Two adjusting-screws R R are disposed in the projection B' on both sides of the fulcrum of the stylus-lever G and are arranged to more or less bend the two ends of this leaf-spring Q. It will be obvious that on unscrewing, say, the left adjusting-screw R in Fig. 1 to release the left part of the spring Q and on screwing so much the right adjusting-screw R that its point more or less bends the right part of the spring Q the stylus-lever G, and therewith also the diaphragm A, will be pressed upward, which means that the latter will be in proportion strained in all radial directions. On screwing the left adjusting-screw R so much that its point either touches or bends a little the left arm of the leaf-spring Q the strain in the diaphragm will be of course altered. In a similar manner the stylus-lever G, with the diaphragm A in Fig. 1, will be pressed downward if the left adjusting-screw R bends the left part of the spring Q, while the right adjusting-screw R is removed from the right part of the spring Q. In this case the diaphragm A will be also strained, and its strain may be altered by screwing the right adjusting-screw R so much that its point either touches or bends a little the right arm of the spring Q. It is further evident that the strain of the diaphragm A may in either case be varied by more or less pressing the ring E alone or with the elastic tube S filled with compressed air or a liquid on the periphery of the diaphragm A without the ring D or by unscrewing the ring E. It is, moreover, evident that the strain of the diaphragm A in case it is pressed downward by the stylus-lever G will be different from that produced if the diaphragm A is pressed upward, since in the former case the ring D bears from below upon the diaphragm A, while in the latter case the ring D releases the diaphragm. In this manner the pitch of the diaphragm A

can be adjusted at will. Obviously this adjustment of the diaphragm A may be effected at any moment, either during the rest or during the operation of the diaphragm.

5 The described pitching devices may be employed for any of the known materials of the diaphragm—that is to say, mica, glass, metal, &c. These materials can be strained, however, within rather narrow limits only. For enlarging the scale of the diaphragm it is therefore preferable to manufacture the diaphragms in other manners. A flexible, tensile, and elastic material should be used which can be strained by means of the above-mentioned pitching devices in a similar manner as a drum-skin, so that the diaphragm so produced may be pitched within very wide limits. The exclusive employment of a flexible, tensile, and elastic material for the whole diaphragm is, however, objectionable, for the reason that the several parts of such a diaphragm would make different independent vibrations, and thus produce an injurious interference with the sound. By the by, this interference has also been stated with other diaphragms made of stiffer materials, such as mica, &c., more particularly in case the diameter of the diaphragm exceeds fifty millimeters. To obviate this defect and secure great amplitude of vibrations in the same diaphragm, the diaphragm comprises a central portion composed of hard material—such as metal, ebonite, mica, wood, &c.—and an outer portion composed of extremely-flexible and radially-stretchable fibrous material, such as leather, bladder, &c.

As the pitching of the diaphragm is effected simply by more or less stretching the elastic border or margin, while the central stiff part does not in any way contribute to the pitch, it is preferable and possible to make the diameter of the central stiff part as large as possible—say almost as large as the internal diameter of the ring D—the more so as the strength of the reproduced sounds increases with the diameter of the working surface.

After the above explanations it will be understood how the sound-box is operated, as it is only necessary to vary the pitch of the diaphragm at the respective moments during the record or reproduction of a speech, song, piece of music, or the like. The pitching of the diaphragm A may be effected either without the stretching-ring D or within the same, or on both places at the same time. In order to strain the diaphragm A without the said ring D, the ring E may be turned through a convenient angle, when it will act direct or by means of the elastic tube S, filled with compressed air or a liquid, upon the border or margin of the diaphragm, or the above-mentioned device for inflating the elastic tube S may be actuated. In order to strain the diaphragm A within the annular support D either of the two adjusting-screws R R, or

both of them, may be adjusted. By so adjusting the diaphragm A it can be given the desired pitch for the speech, song, piece of music, or the like to be recorded or reproduced. During the operation of the phonograph, gramophone, or the like the pitch of the diaphragm may be varied in the manner explained above. These various adjustments coöperate in rendering the diaphragm exceedingly sensitive in a wide variety of pitch. For instance, a given adjustment in either direction within the stretching-ring D by the stylus G will have a different effect under different adjustments outside the stretching-ring D by the inflating-ring S.

In the case of telephones or the like of course the stylus U is dispensed with, while the lever G, with the leaf-spring Q, the hook T, and the two adjusting-screws R R, may be either employed or omitted.

The described sound-box may serve for receiving or transmitting sounds and presents the following advantages: In sound-reproducing devices the stylus-lever G being secured with its end on the stiff part P (in Fig. 3) of the diaphragm A will put into vibration not the center of this part P alone, but the entire part P—that is, nearly the whole surface of the diaphragm destined for the work—and in the same amplitude as the stylus U, so that a louder reproduction of the sound will be the consequence. On the other hand, not only the own tones, (vibrations of the free diaphragm,) but also the disagreeable scraping noise (ringing) during the reproduction of sounds, are very strongly damped or deadened. In sound-recording devices the advantage is obtained that the diaphragm will receive and record only the actual and own vibrations of the sound to be recorded without being influenced by its own vibrations. In both cases the chief advantage resides in the fact that the diaphragm is rendered highly capable of accommodation, so that its pitch may be adjusted during its work not only for any piece of music, but also for any musical phrase, for any instrument, any voice, &c. Thus a tone color and a strength of the notes true to nature are obtained during the reproduction and an increased sensitiveness for any sound during the record is insured and rendered possible.

All the advantages named of the sound-box according to my invention will be more apparent when applying the pitching devices to the known sound recorders and reproducers with two or more simultaneously-working diaphragms. In this case it is preferable for the correct record or reproduction of the whole scale to make the several diaphragms different in size and to pitch them for different successions of notes. As is well known the several diaphragms may be put into vibrations either independently of each other by several styluses disposed in the

same furrow between two waves or conjointly by a common stylus. In the former case the several diaphragms are permitted to work independently of each other, while in the latter case the several diaphragms are connected with the common stylus in the following manner opposite to the usual way in order to procure all the advantages of the above-described sound-box: Seeing that the resistance which is to be overcome for putting the diaphragm into vibrations increases with the height of the pitch, while the amplitude decreases in the same proportion, it will be clear that it is preferable in devices with rocking stylus-levers to connect the several diaphragms not with one and the same point of the common stylus-lever, but with different points of the same, as is diagrammatically shown at Fig. 4. The distances between the fulcrum V of the lever and the joints W and W' of the two diaphragms A and A' should be in the inverse proportion of the resistances of the latter, but in proportion to their amplitudes. In devices without rocking stylus-levers—that is to say, in devices in which each diaphragm has its own stylus in its center and at right angles to it—the centers of the several diaphragms are according to my invention rigidly connected with a common stylus-carrier, as is diagrammatically shown at Fig. 5. In this figure the centers X and X' of the two diaphragms A and A', respectively, are rigidly connected with the two ends of a common stylus-carrier Z, which latter is placed parallel to both diaphragms. The stylus Y should be so placed on the carrier Z that its distance from the center X of the one diaphragm A stands in a proportion to its distance from the center X' of the other diaphragm A', which is the reverse of the proportion between the two resistances of the two diaphragms A and A', respectively, but is the same as the proportion between their amplitudes. Thus it is possible by adjusting the said joints of the diaphragms or the stylus on the carrier to insure the correct effect and the correct properties (tone color, pitch of the several notes, &c.) of each diaphragm, which is of special importance both for the record and for the reproduction of sounds.

With the aid of the described arrangements in devices with several diaphragms the vibrations of each of the several diaphragms will be rendered nearly independent of those of the others. It is true that a similar effect has been obtained in known devices (*vide*, for instance, the German Patent No. 144,706) by employing elastic wires which connect the stylus-carrier with the several diaphragms but there is the defect that the injurious noise of these wires cannot be avoided.

The new sound-box, or particularly the new arrangement of several diaphragms capa-

ble of accommodation, may be utilized as receivers in photophonographs, in which case of course the stylus will require to be replaced by a reflector of any known construction or by a lens in a system of lenses.

The sound-box may be varied in many respects without departing from the spirit of my invention. For example, the clamping-ring E may be replaced by a flange of the ring C or of the border of the box B, so that the endless elastic tube S may be inserted between the diaphragm A and the said flange. This flange may be advantageous in case the elastic tube S is connected with the above-mentioned device for inflating it.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a sound-box for phonographs and the like, the combination of a sound-box provided with an annular stretching-ring and with an annular recess outside said ring, a clamping-ring adjustable on said box and provided with a recess opposite the annular recess of said box, a diaphragm comprising a central disk of hard material and a border of flexible material such as leather, and annular elastic rings disposed in said recesses above and below said border, the outer edge of said diaphragm being clamped between the rim of said box and said clamping-ring.

2. In a sound-box for phonographs, telephones and the like, the combination with a box, of a diaphragm in said box, a stylus-lever secured with its one end on said diaphragm, a slotted plate secured on said stylus-lever near the other end at right angles thereto and having within its slot a sharp edge and without the slot two opposite sharp edges which bear on a face of said box in the plane of said diaphragm, the three sharp edges being in the same axis, a hook in said box and adapted to engage in the slot of said plate and to bear on the respective sharp edge, and means for adjusting said hook, so that said stylus-lever is thereby pivotally connected with said box.

3. In a sound-box for phonographs, telephones and the like, the combination with a box, of a diaphragm in said box, a stylus-lever secured with its one end on said diaphragm, a slotted plate secured on said stylus-lever near the other end at right angles thereto and having within its slot a sharp edge and without the slot two opposite sharp edges which bear on a face of said box in the plane of said diaphragm, the three sharp edges being in the same axis, a hook in said box and adapted to engage in the slot of said plate and to bear on the respective sharp edge, means for adjusting said hook, a leaf-spring secured with its center in said plate parallel to said stylus-lever, and two adjusting-screws in said box on both sides of said plate and adapted to more or less bend the

two parts of said leaf-spring, so that said diaphragm may be strained to adjust it for any pitch.

4. In a sound-box for phonographs, tele-
 5 phones and the like, the combination with a
 box, of an annular support in said box and
 concentric therewith, a diaphragm secured at
 its periphery in said box and bearing on said
 annular support, a clamping-ring adjustable
 10 in said box by means of an arm, an endless
 elastic tube between said clamping-ring and
 said diaphragm and adapted to bear on the
 latter without said annular support, means
 for inflating said endless elastic tube, a stylus-
 15 lever secured with its one end on said dia-
 phragm, a slotted plate secured on said stylus-
 lever near the other end at right angles
 thereto and having within its slot a sharp
 edge and without the slot two opposite sharp
 20 edges which bear on a face of said box in the
 plane of said diaphragm, the three sharp
 edges being in the same axis, a hook in said
 box and adapted to engage in the slot of said
 plate and to bear on the respective edge,
 25 means for adjusting said hook, a leaf-spring
 secured with its center in said plate parallel
 to said stylus-lever, and two adjusting-

screws in said box on both sides of said plate
 and adapted to more or less bend the two
 parts of said spring-leaf, so that by actuating 30
 said means or by adjusting said clamping-
 ring or said two adjusting-screws said dia-
 phragm may be strained without or within
 said annular support or on both sides at a
 time to adjust it for any pitch. 35

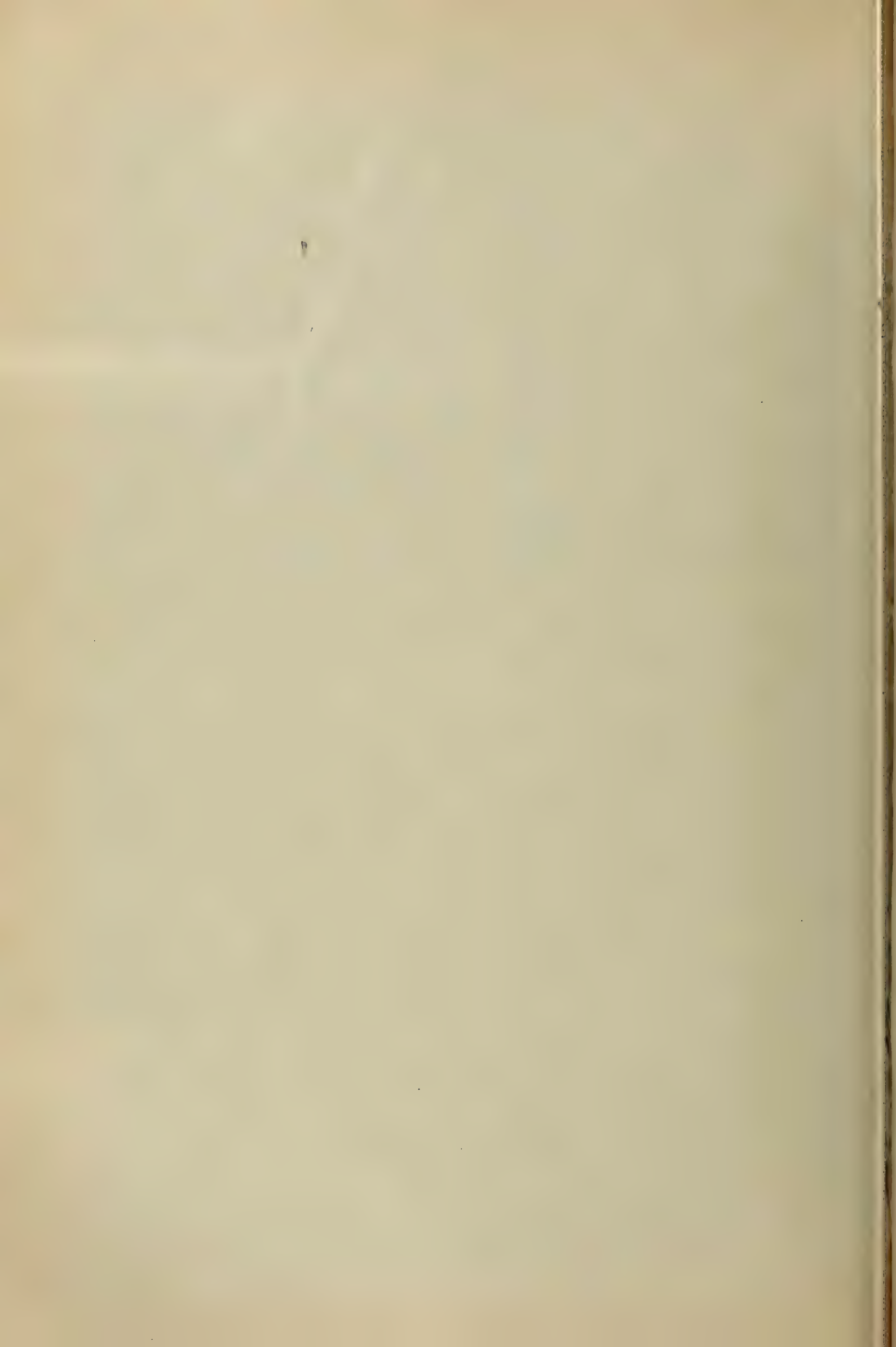
5. In a sound-box for phonographs, tele-
 phones and the like, the combination with a
 plurality of diaphragms each capable of ac-
 commodation to any pitch by varying its
 strain, of a common stylus-carrier connected 40
 at different points with said plurality of dia-
 phragms, the several diaphragms having dif-
 ferent sizes and being pitched for different
 progressions of notes and the proportion of
 the distances of their joints from the axis be- 45
 ing the inverse of that of their resistances and
 being the same as that of their amplitudes.

In testimony whereof I have signed my
 name to this specification in the presence of
 two subscribing witnesses.

PIOTR LEBIEDZINSKI.

Witnesses:

HENRY HASPER,
 WOLDEMAR HAUPT.



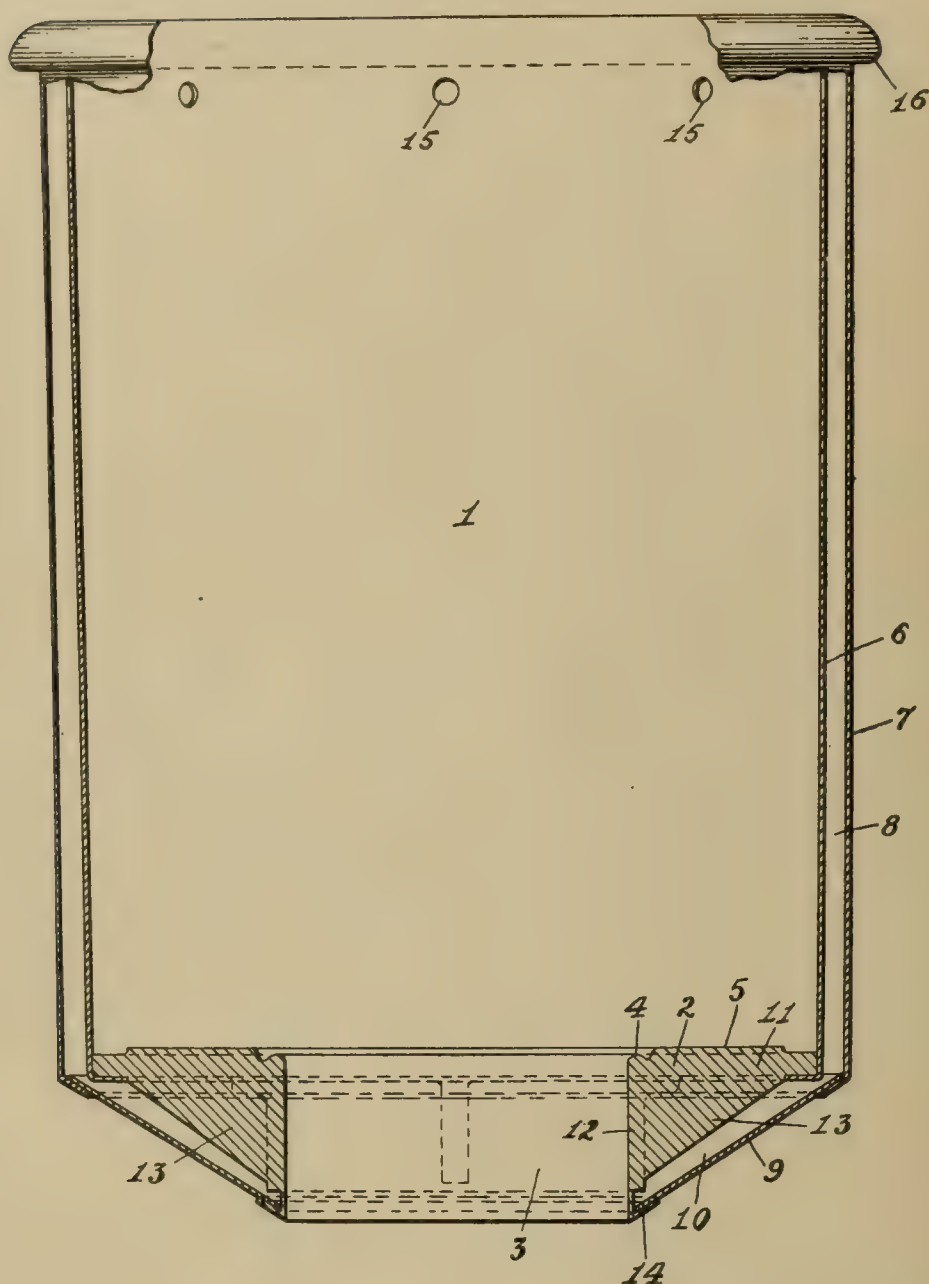
Page 12

No. 827,295.

PATENTED JULY 31, 1906.

D. A. DODD.
MOLD SUPPORT.

APPLICATION FILED SEPT. 14, 1905.



Attest:
Edgeworth Brown
Deputy Notary

Inventor:
David A. Dodd
by *Frank L. Hyer* Att'y.

UNITED STATES PATENT OFFICE.

DAVID A. DODD, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MOLD-SUPPORT.

No. 827,295.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed September 14, 1905. Serial No. 278,394.

To all whom it may concern:

Be it known that I, DAVID A. DODD, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Mold-Supports, of which the following is a description.

My invention relates to apparatus for use in the molding of phonographic sound-records, and more particularly in a molding process wherein a tubular mold is caused to descend into a bath of molten material which fills the mold and a coating of which congeals on the interior surface thereof and adheres to the same when the mold is removed from the bath.

In the use of the apparatus contemplated by me the support itself enters the bath with the mold, and obviously upon the removal thereof its exterior will be coated with congealed material. If this material is allowed to set or harden thereon, it will be difficult to remove the same. It is, however, necessary that this material be removed after each immersion, because otherwise it would increase in thickness with successive immersions and interfere with the molding operation.

My invention has for its object the provision of an improved support from which the congealed material may be easily detached or removed; and it consists in the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawing, which shows in sectional elevation one form of device in which my invention may be embodied.

The mold-support is preferably in the form of a hollow body 1, decreasing slightly in diameter from top to bottom and comprising a base 2, formed with a circular opening 3, surrounded by a seat 4, upon which the mold is adapted to rest, and having a flat portion 5, upon which a removable water-jacket may rest, surrounding the mold. The wall of the support is composed of two cylinders 6 and 7, separated by an air-space 8. The base 2 may be a brass casting comprising a horizontal web 11, a vertical web 12, and stiffening-ribs 13. The member 6 is secured to the

web 11, and the member 7 is secured to a conical member 9, the lower portion of which is secured to the web 12, whereby a continuation of the air-space 8 is formed between the base 2 and member 9. The lower part of the web 12 is made thin and may be spun over the member 9, as shown at 14. The member 6 is provided with apertures 15. The upper portion of the support is provided with a flange 16 to engage a supporting-ring, (not shown,) by which the mold-support may be raised and lowered the desired distance at proper times. During the time the mold and mold-support are in the bath of molten material the air contained in the chambers 8 and 10 will become heated. When the support is raised out of the bath, the heated air will prevent the hardening of the layer of material which has congealed upon the exterior of the mold-support 1 by reason of its high temperature and also because it is a poor conductor of heat, and therefore prevents the transference of heat from the outer wall of the support to the inner wall, the temperature of which is comparatively low on account of the proximity thereto of the water-jacketed mold, so that the congealed material will either drop from the support by its own weight or can be very readily detached therefrom by the operator.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In an apparatus of the character described, a mold-support comprising a base having an opening, a mold-seat surrounding said opening and a wall rising from said base, said wall being provided with an air-chamber, substantially as set forth.

2. In an apparatus of the character described, a mold-support comprising a base having an opening, a mold-seat surrounding said opening and a wall rising from said base, said base and wall being provided with air-chambers, substantially as set forth.

3. In an apparatus of the character described, a mold-support comprising a base having an opening, a mold-seat surrounding said opening and a wall rising from said base

and comprising inner and outer members separated by an air-space, substantially as set forth.

5 4. In an apparatus of the character described, a mold-support comprising a base having an opening, a mold-seat surrounding said opening and a wall rising from said base and comprising inner and outer members

separated by material which is a poor conductor of heat, substantially as set forth. 10

This specification signed and witnessed this 12th day of September, 1905.

DAVID A. DODD.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

L. GARDY.

SOUND BOX WITH COUPLED DIAPHRAGMS FOR DISK TALKING MACHINES.

APPLICATION FILED NOV. 29, 1905.

FIG 1.

FIG 2.

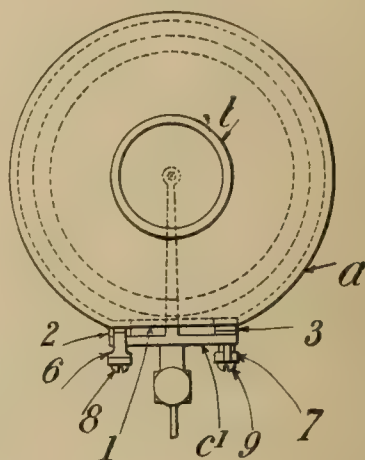
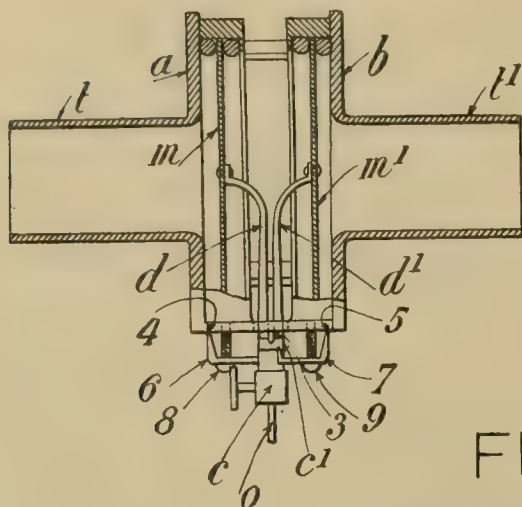


FIG 3.

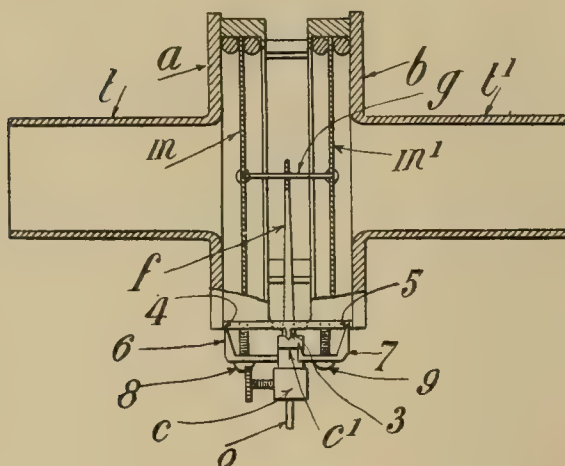
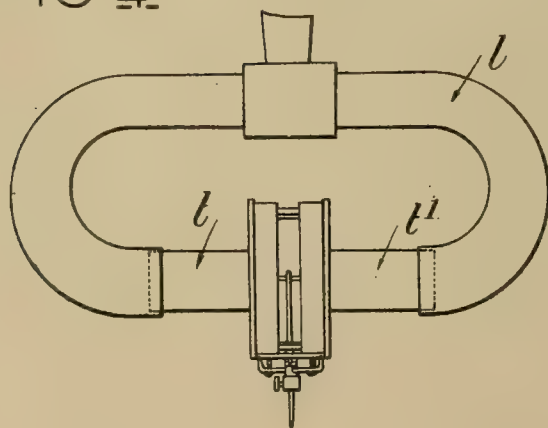


FIG 4.



Witnesses:-

C. H. Crawford
N. M. Reunon

Inventor:

Laurent Gardy
by P. Singer Attorney

UNITED STATES PATENT OFFICE.

LAURENT GARDY, OF PERPIGNAN, FRANCE.

SOUND-BOX WITH COUPLED DIAPHRAGMS FOR DISK TALKING-MACHINES.

No. 828,309.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed November 29, 1905. Serial No. 289,653.

To all whom it may concern:

Be it known that I, LAURENT GARDY, a citizen of France, residing at 5 Rue de la Fusterie, Perpignan, Pyrénées-Orientales, France, have invented new and useful Improvements in Sound-Boxes with Coupled Diaphragms for Disk Talking-Machines, of which the following is a specification.

This invention has for its object a sound-box for disk talking-machines in which two vibrating diaphragms arranged opposite each other are directly connected to a single pin-holder placed between them. By such a construction a double reproduction in two distinct horns or an amplified reproduction in one same horn can be obtained, as will be hereinafter explained. The same device can also be used as recorder.

In the annexed drawings, Figure 1 is a longitudinal section of a form of construction of the sound-box with coupled diaphragms. Fig. 2 is a side view of the sound-box. Fig. 3 is a longitudinal section of a slightly-modified construction, and Fig. 4 shows the device by means of which a single horn can be employed in connection with the sound-box with coupled diaphragms.

Referring to Fig. 1 of the drawings, it will be seen that two ordinary single boxes *a* and *b* are coupled in such a manner that their vibrating diaphragms *m* and *m'* are placed opposite each other. These boxes are secured to each other by their periphery in a certain number of points, but in such a way as to leave the space between the two diaphragms in direct connection with the outside air. A pin-holder *c* is mounted on the wall of the whole thus formed and is extended between the two diaphragms by a yoke, the branches *d* and *d'* of which are properly separated in order to be fixed, respectively, on the diaphragms *m* and *m'*. The air-chamber behind each diaphragm is extended, as usually, by a tubulure *t* or *t'*, adapted to transmit the vibrations. The mounting of the pin-holder on the wall of the apparatus is assured in the following manner: On a flat portion 1 of the metallic frame of the apparatus are provided two V-shaped projections 2 and 3 and two V-shaped notches 4 and 5.

The cross-bar *c'*, made integral with the pin-holder *c*, has in turn two V-shaped notches on its lower face and two V-shaped notches on its upper face. The cross-bar is placed in such a manner that the notches of the lower face are astride with the projections 2 and 3, and the pin-holder is secured in position by means of two yoke-hoops 6 and 7, engaging their sharp ends, respectively, with the notches 4 and 5 and with the notches on the lower face of the cross-bar *c'* and by means of two screws 8 and 9, which wedge the yoke-hoops by being screwed into the flat portion 1 of the frame. By this way of mounting the pin-holder the latter is held tightly, though a certain movableness is afforded thereto and it can be very easily removed.

In the form shown in Fig. 3 the pin-holder *c*, instead of being extended by a yoke, is terminated in a branch *f'*, through the end of which passes a thin rod *g*, secured by the middle to said branch and by its ends to the diaphragms *m* and *m'*, respectively. The rest of the construction is not altered.

It will be understood that in either case when the pin *o* moves along the grooves of a recorded disk it will transmit to the two diaphragms *m* and *m'* simultaneous and concurrent vibrations, which may be received in two horns, respectively, connected to the tubulures *t* and *t'*.

If it is desired to obtain a reproduction in only one of the horns, it will only be needed to connect the two tubulures *t* and *t'* by means of a C-shaped conduit *l* and to join the middle part of said conduit provided with an opening to the nozzle of a single horn.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A sound-box for disk talking-machines, comprising two metallic boxes, means for securing these boxes together and opposite to each other, two parallel vibrating diaphragms fixed respectively in each box, a pin-holder placed between the two diaphragms, means for connecting said pin-holder to each diaphragm, an exterior cross-bar made integral with the pin-holder, notches provided in said cross-bar, projec-

tions and notches provided in the metallic frame, two yoke-hoops resting on the cross-bar and on the metallic frame, and two screws wedging the said yoke-hoops by being
5 screwed into said metallic frame, substantially as described and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LAURENT GARDY.

Witnesses:

H. ALIN,

A. W. BRANN.

No. 828,551.

PATENTED AUG. 14, 1906.

E. R. JOHNSON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 12, 1904.

Fig 1

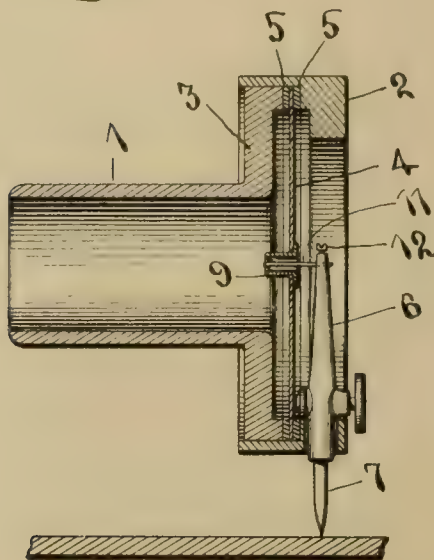
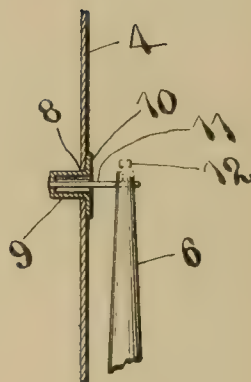


Fig 2.



WITNESSES:

F. J. Hartman.
Edw. W. Vaill Jr.

INVENTOR
Eldridge R. Johnson.
BY *Wm. Feltz.*
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 828,551.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed November 12, 1904. Serial No. 232,391.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

In the reproduction of sound from talking-machine records, either of the type having vertical undulations in the record-grooves or of the type having horizontal undulations in the said groove, it is well known that many sounds are reproduced which are due to imperfections in the construction and disposition of the parts of the talking-machine. One of the most serious of these undesirable sounds I have found to be due to the comparatively stiff and short connection hitherto employed between the end of the stylus-bar and the diaphragm. This connection tends to oscillate about the center of the oscillation of the stylus-bar, and therefore delivers the vibrations to the diaphragm at constantly-varying angles to the plane of the diaphragm, dependent upon the position of the stylus-bar at any particular moment.

The object of my invention is to provide a construction in which a long and flexible connection may be used between the end of the stylus-bar and the diaphragm, so that the angle which said connection subtends as the stylus-bar oscillates will be greatly reduced and that the connection will bend or be flexible to transmit the vibrations in a direction substantially perpendicular to the diaphragm irrespective of the position of the stylus-bar in its oscillation about its fulcrum.

A further object of my invention is to provide a construction in which such long and flexible connection may be applied to sound-boxes constructed and arranged in the ordinary manner.

For a full, clear, and exact description of one embodiment of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a central longitudinal sectional view of a sound-box embodying my improvement, and Fig. 2 is a similar view showing the diaphragm and stylus-bar separated from the sound-box.

Referring to the drawings, the numeral 1 indicates the tubular portion of the sound-box casing, which is adapted to be connected with the sound-conveying means or amplifying-horn, and 2 the outer cylindrical part of the casing thereof. The tubular portion 1 terminates in a disk-shaped portion 3, between which and the end of the cylindrical casing 2 the diaphragm 4 is retained, suitable gaskets 5 being inserted between said diaphragm and the adjacent portions of the casing.

The stylus-bar 6 is fulcrumed upon the cylindrical portion of the casing 2 in any well-known manner and has the stylus or needle 7 removably retained in its outer end. At the center of the diaphragm 8 I form an offset by providing the diaphragm with a small circular opening, through which projects a cylindrical or cup-shaped piece of metal 9, having an annular flange 10 at one end thereof, said annular flange contacting with and being secured to the outer side of the diaphragm 4. Said cup and flange are preferably stamped or spun from thin sheet metal and are made as light as is consistent with strength and durability. To the center of the end of the cup-shaped offset 9 I attach a small wire 11 or other suitable flexible connecting means, the opposite end of which is secured to the inner end of the stylus-bar 6, in this instance by means of the screw 12.

It will now be seen that when sounds are being reproduced from the record the stylus-bar 6 will be vibrated in the usual manner, and said vibrations will be transmitted to the diaphragm 4 at all times perpendicular to the plane of the diaphragm, whether the vibrating end of the stylus-bar to which the connection is secured be on one or the other side of its normal position.

Owing to the extension of the cup-shaped portion 9, the flexible wire connection 11 may be made much longer than is possible when said connection is attached directly to the center of the diaphragm, thus allowing said connection to subtend a smaller angle and to bend more easily to accommodate itself to the oscillatory motion of the stylus-bar 6 as it vibrates about its fulcrum.

Having thus described my invention, it will be obvious that certain changes may be made in the form, proportion, and arrange-

ment of parts without departing from the spirit and scope of my invention; but

What I claim, and desire to protect by Letters Patent of the United States, is —

5 1. In a sound-box for talking-machines, the combination with a stylus-bar, of a diaphragm, a small offset located on said diaphragm and extending in a direction away from said stylus-bar and a connecting-piece
10 between said stylus-bar and said offset the said connecting-piece being free to flex out of its axis at any point between its connecting ends.

2. In a sound-box for talking-machines,
15 the combination with a stylus-bar, of a diaphragm, an offset located at the center of said diaphragm and extending in a direction away from said stylus-bar and a flexible connection between said stylus-bar and said offset the said connection being free to flex out
20 of its axis at any point between its connecting ends.

3. In a sound-box for talking-machines, the combination with a diaphragm, of a stylus-bar on one side of said diaphragm, a flexible connection carried by said stylus-bar and means to secure said flexible connection to said diaphragm at a point on that side of the diaphragm opposite to that on which said
30 stylus-bar is located the said connection being free to flex out of its axis between its points of contact with said diaphragm and stylus-bar.

4. In a sound-box for a talking-machine,
35 the combination with a stylus-bar, of a diaphragm provided with an opening, a hollow body located in said opening with one of its ends secured to said diaphragm and with its other end located on that side of the diaphragm opposite to that on which said stylus-bar is located, and a connection between said stylus-bar and said body the said connection being free to flex out of its axis between its connecting ends.

45 5. In a sound-box for a talking-machine, the combination with a stylus-bar, of a dia-

phragm provided with an opening, a hollow body located in said opening with one of its ends secured to said diaphragm and with its other end located on that side of the diaphragm opposite to that on which said stylus-bar is located, and a flexible connection between said stylus-bar and said body the said connection being free to flex out of its axis between its connecting ends. 50 55

6. In a sound-box for talking-machines, the combination with a stylus-bar, of a diaphragm provided with a small central aperture, a light hollow body having a flanged opening at one end and closed at the other
60 end, the flanged open end being secured to the edge of said aperture and the closed end being located on that side of the diaphragm opposite to that on which said stylus-bar is located, and a connection between said stylus-bar and the closed end of said body. 65

7. In a sound-box for talking-machines, the combination with a stylus-bar, of a diaphragm provided with a small central aperture, a light hollow body flanged at one end and closed at the other end, the flanged end being open and secured to the edge of said aperture and the closed end being located on that side of the diaphragm opposite to that on which said stylus-bar is located, and a
75 flexible connection between said stylus-bar and the closed end of said body.

8. In a sound-box for talking-machines, the combination with a plane diaphragm, a stylus-bar, a light hollow body secured to the
80 central portion of said diaphragm and a straight flexible connection between said stylus-bar and said body, said connection being longer than the distance between the end of the stylus-bar and the plane of the diaphragm and being free to flex out of its axis. 85

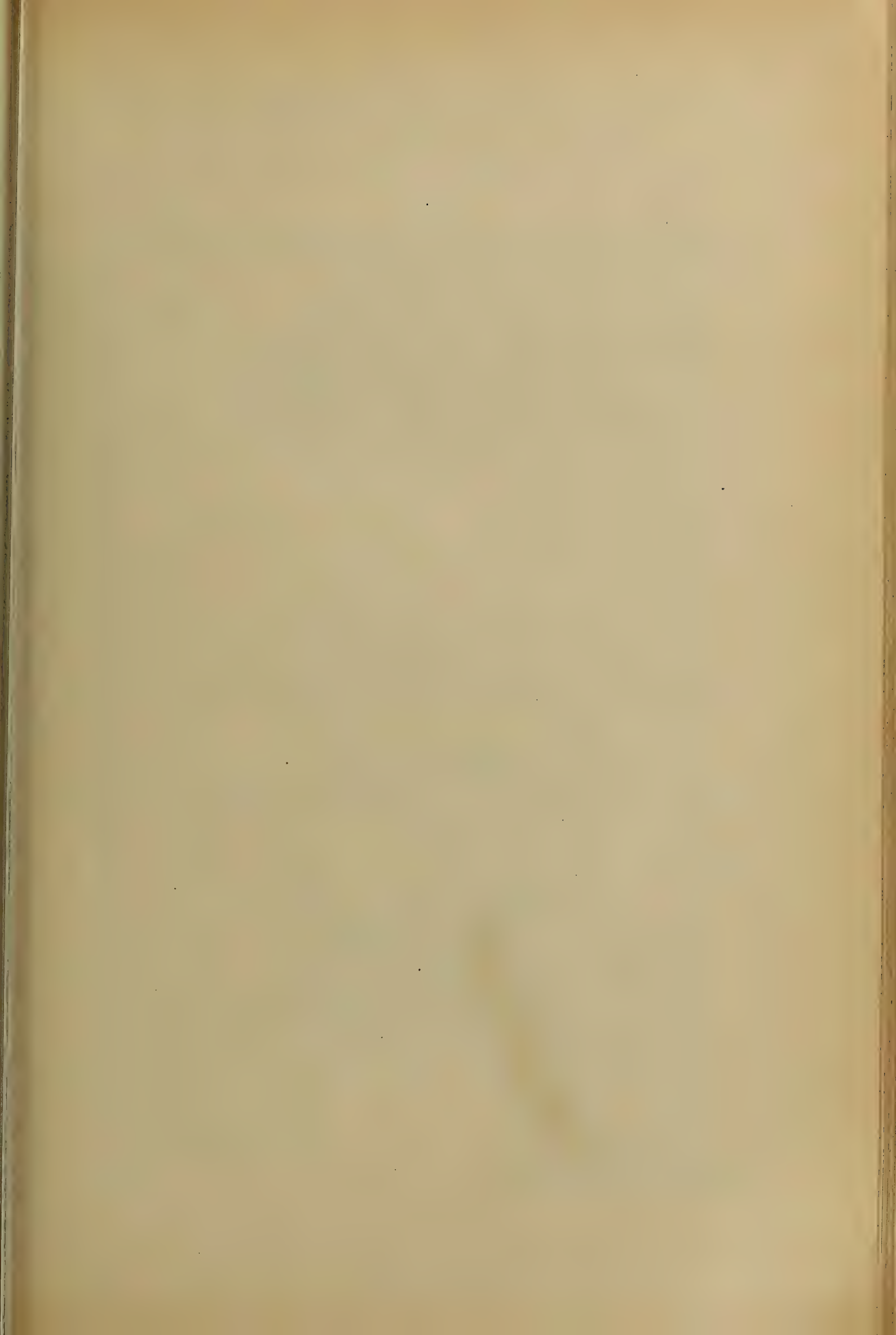
In witness whereof I have hereunto set my hand this 10th day of November, A. D. 1904.

ELDRIDGE R. JOHNSON.

Witnesses:

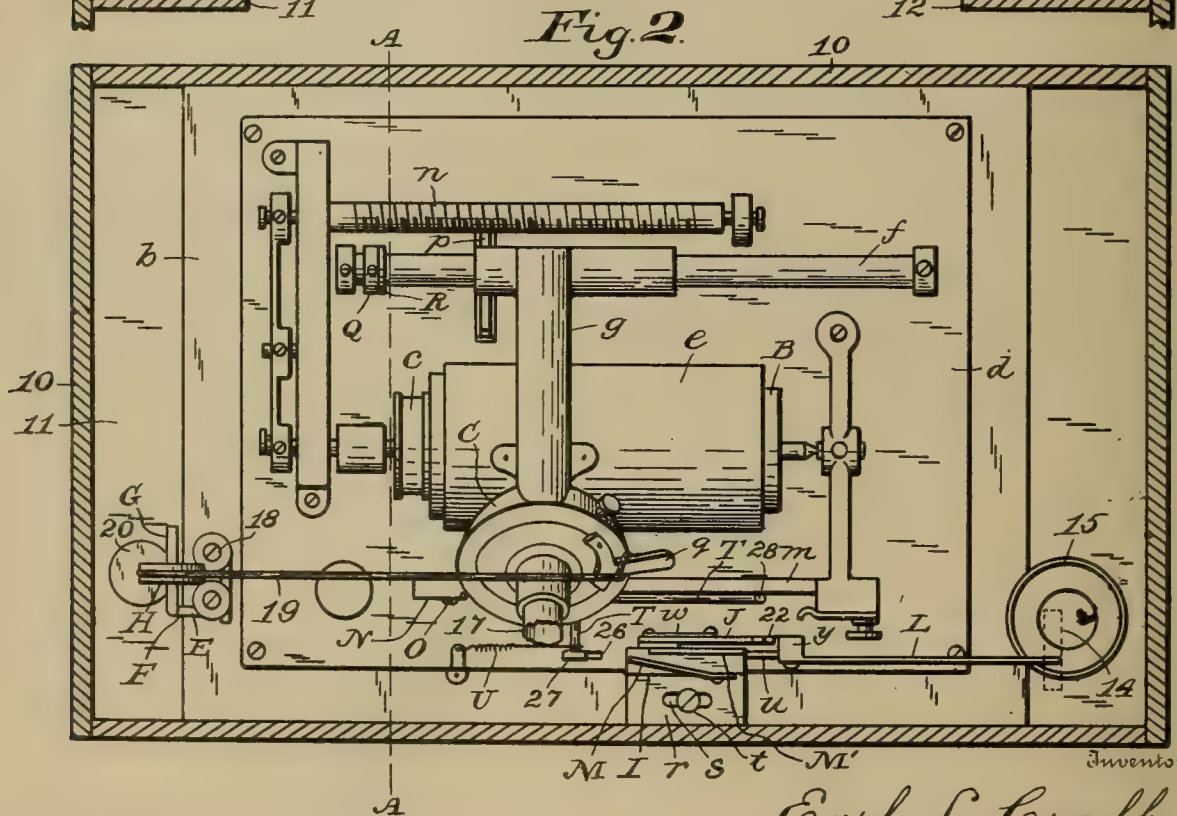
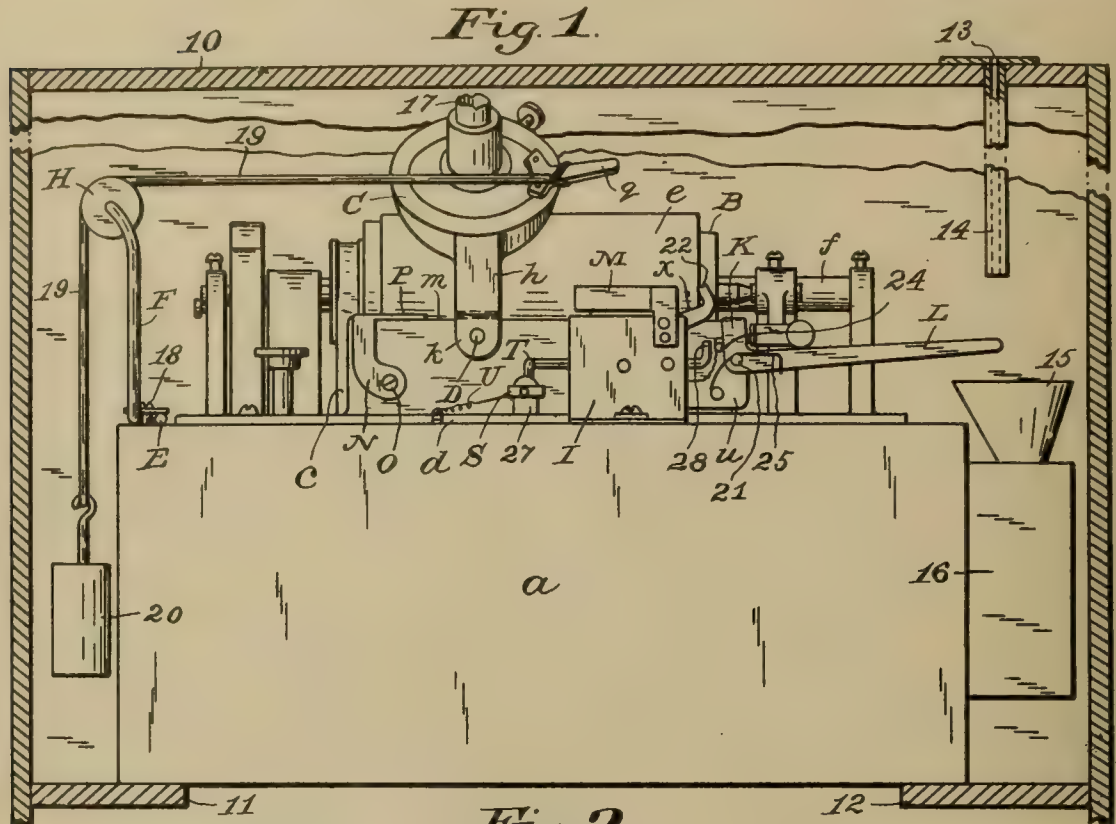
JOHN T. GRADY,

HORACE PETTIT.



E. L. CRABB.
REPEATING ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JUNE 28, 1905.

2 SHEETS—SHEET 1.



Witnesses:

Wm. Thompson
Stella Snider.

Inventor:
Earl L. Crabb,
by
E. T. Silvius,
Attorney.

E. L. CRABB.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 28, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

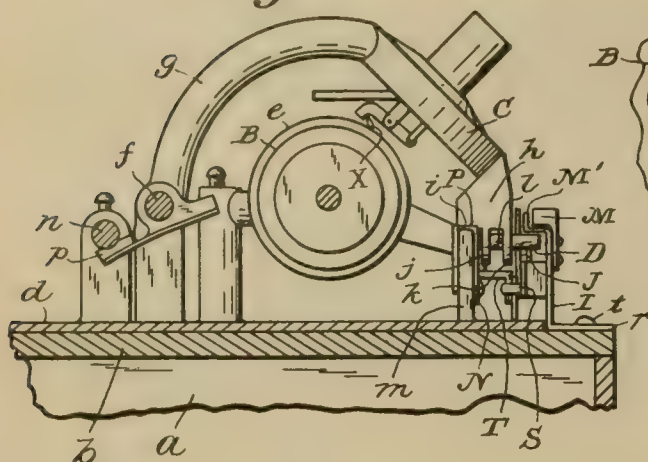


Fig. 4.

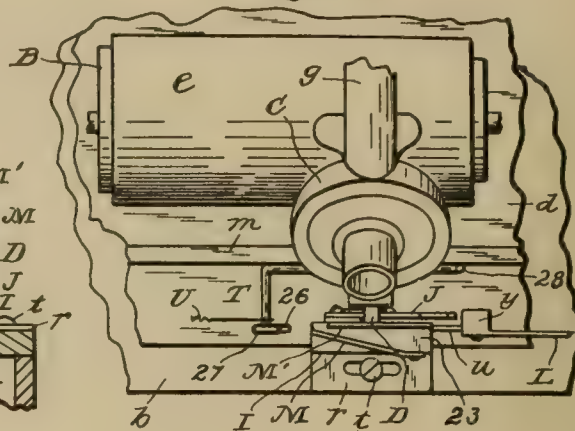


Fig. 5.

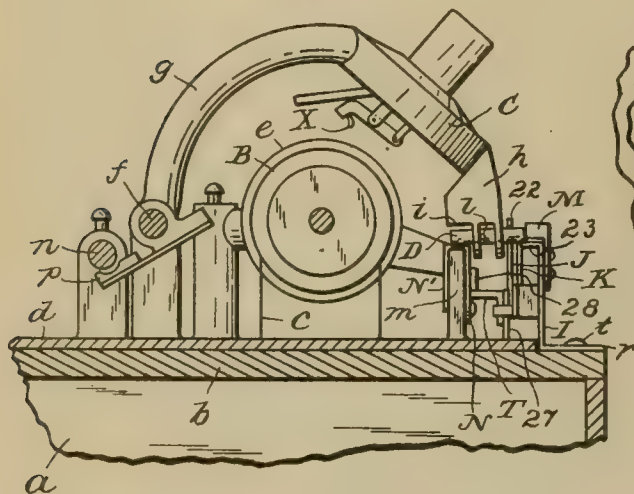


Fig. 6.

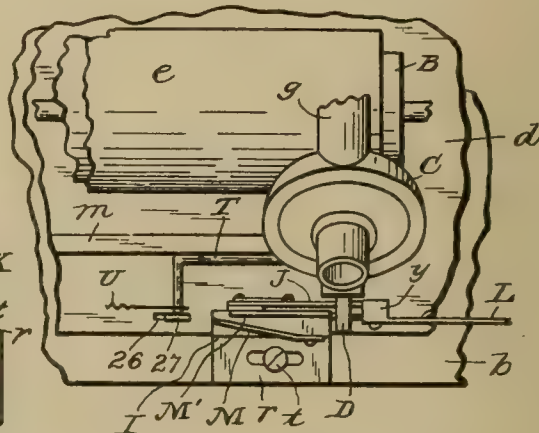
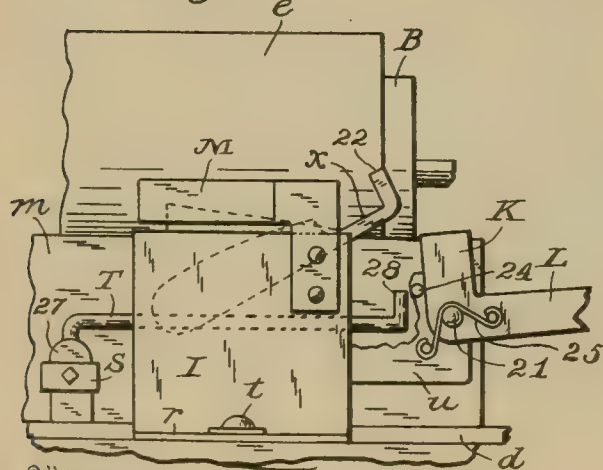


Fig. 7.



Witnessed

Wm. Thompson
Stella Snider.

Fig. 8.

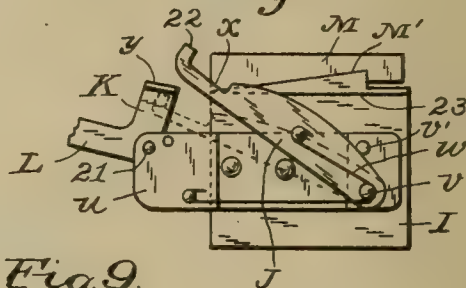


Fig. 9.



Inventor:

Earl L. Crabb,
by
E. J. Silvius,
Attorney.

UNITED STATES PATENT OFFICE.

EARL L. CRABB, OF INDIANAPOLIS, INDIANA.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

No. 828,598.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed June 28, 1905. Serial No. 267,338.

To all whom it may concern:

Be it known that I, EARL L. CRABB, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Repeating Attachments for Coin-Controlled Phonographs; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to the class of phonographs that are inclosed in cabinets and coin-controlled; and the invention has particular reference to attachments that are adapted to be connected either permanently or detachably to well-known types of phonographs that are not originally constructed as repeating machines and not coin-controlled, the attachments when applied to such machines enabling them to repeat the records that may be on their mandrels and rendering the machines capable of being coin-controlled.

Objects of the invention are to provide improved and simple attachments for phonographs and similar instruments and adapted to be constructed at relatively small expense for converting simple phonographs into coin-controlled repeating instruments, which attachments may be adapted to be readily removed from the instruments.

The invention consists in a phonograph attachment comprising brake-operating mechanism for stopping the instrument at the end of the record and improved mechanism adapted to be put in motion by coins for restarting the instrument, so as to repeat the record, the attachment being designed to cooperate with phonographs that have reproducer-arms movable on guides and carrying movable devices that may be interposed between the guides and the reproducer-arms for holding the reproducers away from the records.

The invention consists, further, in the novel parts and in the novel combinations and arrangement of parts, as hereinafter particularly described, and pointed out in the appended claims.

Referring to the drawings, Figure 1 is a front elevation of a phonograph having the improvement applied thereto and arranged in a cabinet, shown in section, of which parts are broken away; Fig. 2, a top plan of the

machine and the improvement, the cabinet being shown in section on a plane above the phonograph; Fig. 3, a transverse sectional view on the line A A in Fig. 2, showing the parts of the instrument in proper position to operate; Fig. 4, a fragmentary top plan view showing the reproducer near the end of its travel; Fig. 5, a transverse sectional view similar to Fig. 3 except that the reproducer is elevated, as when returning to repeat. Fig. 6, a fragmentary top plan view showing the reproducer at the end of its travel, as when locked at rest ready to be released to return; Fig. 7, a fragmentary enlarged detail view showing parts seen in Fig. 1; Fig. 8, an elevation of the devices that cooperate to release and elevate the reproducer, so that it may return for repeating; and Fig. 9, a perspective view of the part that causes the reproducer to be replaced into contact with the record for repeating at the beginning of its travel.

Similar reference characters in the different figures of the drawings designate like elements or features.

The phonograph as heretofore constructed comprises among its essential elements a case *a* for the motor mechanism and having a cover *b* for supporting the upper works of the instrument. In the present invention these need not be elaborate in design, since the case is inclosed in a suitable cabinet 10, being supported on brackets 11 and 12 thereof.

Other features of the phonograph are a driving-belt *c*, driven by the motor and driving a mandrel B, mounted on a base *d*, that rests on the cover *b* and directly supports the upper works, a record *e*, a guide *f*, a reproducer-arm *g*, mounted on the guide and having an integral reproducer-head C, in which a reproducer is mounted, the arm *g* also having a controller comprising an integral head *h*, provided with a shoulder *i* and lips *j* and *k* forward of the shoulder, the lips supporting a guide-pin D, movable longitudinally, that has a stop-pin *l* arranged between the lips, a guide-bar *m* for guiding the reproducer, a feed-screw *n*, a nut *p*, carried by the base of the arm *g*, and a reproducer-lever *q*.

The cabinet 10 may be made in various designs and normally closed, and in the top thereof is a coin-slot 13, beneath which a coin-chute 14 is supported that leads to a suitable point above a hopper 15, emptying into a suitable bin 16, with which the cabinet is provided to receive the coins. The repro-

ducer will be supplied, as usual, with a tube 17, extending through the top of the cabinet with earpieces, as will be understood.

For returning the reproducer to the starting-point apparatus is employed comprising a base E and a pillar F, having an axle G, all formed of a bent wire and having the base secured to the cover *b* by screws 18, there being a guide-sheave H on the axle, and a cord or cable 19 is connected to the lever *g* and runs over the sheave, a weight 20 being attached to the end of the cord.

A particularly novel part of the invention comprises a stand I, having a base *r*, in which is a slot *s* to receive a securing-screw *t*, which holds the base adjustably upon the cover *b*, the stand being near the front of the guide-bar *m* near the terminal end thereof and having a projection *u* and supporting a vertically-swinging arm J, that is mounted at one end thereof on a pivot *v*, which is attached to the stand, the arm being normally held upwardly against a suitable stop *v'* by a spring *w*, that is mounted on the stand. The arm J has a recess *x* in its top near the free end thereof. A latch-arm K is mounted on a pivot 21, that is attached to the projection *u* of the stand I and has a catch-plate *y*, adapted to be engaged by the free end of the arm J to push the latch-arm aside when the arm J descends the catch-plate then engaging the top 22 of the end of the arm J to latch it in its depressed position. The latch-arm K is provided with a lever L, that extends under the terminal or discharge end of the coin-chute 14, and this lever may be of any required length and shape for the purpose designed. The stand I is provided with a lateral guide 23, against which the pin D may be pressed by the arm J, a guide M being attached to the stand and the guide 23 supporting a guide M'. The lever L is normally pressed upwardly and the latch-arm pressed against a stop 24 by a spring 25, the stop and the spring being mounted on the projection *u* of the stand I.

A guide-base comprising connected opposing parts N and N' is clamped by a screw *o* to the guide-bar *m* and supports an oblique-angled guide P upon the guide-bar to be engaged by the inner end of the pin D for forcing the pin from the guide-bar on the return of the reproducer.

A collar Q, having a cushion R, is attached to the guide *f* for stopping the arm *g*.

Phonographs of the character shown each have a slot 26 in the base *d*, and a brake-lever that is connected to brake mechanism of the motor extends through the slot for manual manipulation of the brake. In order to operate the brake automatically, as is required in coin-controlled apparatus, a clamp S is attached to the lever 27 and a reach-rod T is attached to the clamp and extends along the front of the guide-bar *m* toward the terminal

thereof and has an upturned end 28, adapted to be engaged by the head *h* after the reproducer has traversed the record. The brake-lever is held in its inoperative position by a suitable spring U.

In practical use, having first prepared the phonograph for operation, the motor thereof may be started, and when the pin D moves upon the arm J the pin will be prevented from rising by engaging the under side of the guide 23, and thereby the arm J will be compelled to move downwardly to permit the pin to pass onward to the end of its traveling distance, and as the arm J descends its end 22 will push back the arm K and pass under and be latched by the plate *y*, the pin D moving a short distance in the recess *x* until the head *h* engages the end 28, resulting in a movement of the lever 27 and a gradual stopping of the whole phonograph machinery, the nut *p* remaining in contact with the feed-screw *n* and preventing release of the brake. A coin may be inserted in the slot 13 and allowed to descend the chute 14, from which it must fall upon the lever L and thence into the hopper 15. The impact of the coin on the lever will cause the catch-plate *y* to be retracted, so as to allow the arm J to rise, engaging the pin D and lifting the head *h*, so as to remove the shoulder *i* thereof from the guide-bar *m*, the nut *p* being simultaneously disengaged from the feed-screw *n*. At the same time the head *h* will release the reach-rod T and the spring U will retract the brake-lever 27, so that the brake will release the motor, permitting the restarting of the motor and the entire machinery. The arm J will elevate the pin D, so that the latter may ride temporarily on the guide M' while the reproducer begins to return, and the guide M will force the pin D onto the guide-bar *m*, the reproducer being returned to its starting-point by means of the weight 20 and its connections or other equivalent device that may be provided. When the reproducer arrives at its starting-point, the pin D will engage the guide P, and thereby be forced forwardly from the guide-bar *m*, and thus permit the head *h* to descend onto the guide-bar and the reproducer to descend until the contact-piece X engages the record, when the record will be repeated and the operations cease at the end thereof, as above described, to be again begun only by the use of a coin, as before.

Having thus described the invention, what is claimed as new is—

1. In coin-controlled apparatus for phonographs, a pivoted spring-pressed depressible lifting-arm provided with a latch mounted in the path of the arm and retractable thereby, the latch having an operating-lever and spring-pressed into engagement with and holding the depressed lifting-arm, a phonograph-record, a traveling reproducer-arm, a motor for the record and the reproducer-arm,

a brake for the motor, a device connected movably to the reproducer-arm and movable thereby into engagement with and depressing the lifting-arm into latching engagement with the latch, and a reach-rod connected with the brake and having an upturned end in the path of the reproducer-arm and engageable thereby after the latching of the lifting-arm occurs.

10 2. In coin-controlled apparatus for phonographs, the combination with a record, a traveling reproducer-arm, a movable guide-pin mounted on the reproducer-arm, and a motor for the record and the reproducer-arm,
15 of a motor-brake provided with a reach-rod having an end in the path of the reproducer-arm and engageable thereby, a lifting-arm depressible by the guide-pin, a latch movable into engagement with the depressed lifting-arm, and an operating-lever attached to the
20 latch operating to move the latch out of engagement with the lifting-arm, the lifting-arm when released engaging the guide-pin and thereby lifting the reproducer-arm out
25 of engagement with the reach-rod.

3. In coin-controlled apparatus for phonographs, the combination of a support, a guide on the support, a lifting-arm pivoted on the

support and normally spring-pressed beyond the plane of the guide, and a latch pivoted on the support adjacent to the arm for preventing the arm from moving beyond the plane of the guide. 30

4. In coin-controlled apparatus for phonographs, the combination with a portable stand provided with a supporting-base and having a guide approximately parallel to the bottom of the base, a guide on the stand inclined to and above the plane of the other guide, and a depressible lifting-arm pivoted on the stand and normally spring-pressed beyond the plane of the first-mentioned guide, of a latch pivoted on the stand and spring-pressed into the path of the lifting-arm and retractable thereby, the latch being capable of engaging the lifting-arm and preventing its movement beyond the plane of the guide and having an operating-lever for moving the latch to release the arm. 40 45

In testimony whereof I affix my signature in presence of two witnesses. 50

EARL L. CRABB.

Witnesses:

WM. C. THOMPSON,
E. T. SILVIUS.

No. 828,602.

PATENTED AUG. 14, 1906.

J. C. ENGLISH.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 12, 1904.

Fig 1.

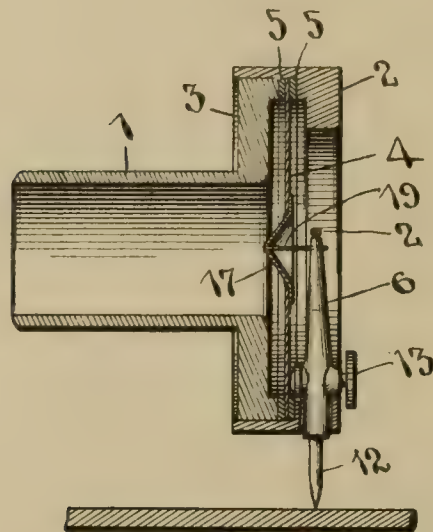


Fig 2.

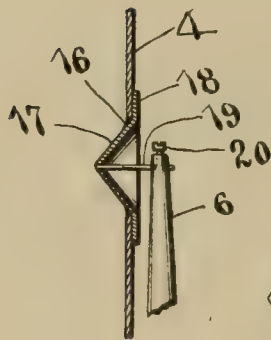


Fig 3.

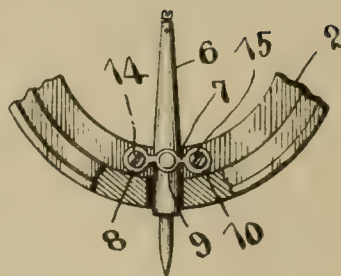
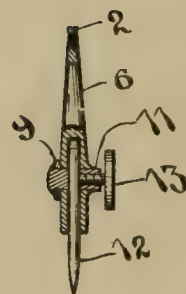


Fig 4.



WITNESSES:
F. J. Hartman.
Edw. W. Vaile Jr.

INVENTOR
John C. English
BY *10me Peters*
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 828,602.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed November 12, 1904. Serial No. 232,388.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have
5 invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

In the reproduction of sound from talking-machine records, either of the type having vertical undulations in the record-groove or of the type having horizontal undulations in the record-groove, it is well known that the diaphragm of the sound-box or reproducer
10 vibrates in parts, and the center of the diaphragm being farther from the points which are confined in the casing of the sound-box responds more readily to the vibrations of the stylus-bar than at the portions adjacent
20 the outer edge of the same. Vibrations which are of high frequency and which are not exactly sinusoidal or harmonic in form more readily act upon the center of the diaphragm than upon the outer portions thereof,
25 which respond more readily to the vibrations of less frequency. The vibrations which are not true harmonic or sinusoidal curves are those caused by the inaccurate action of the stylus-bar, due to frictional contact with the
30 bottom of the sound-groove or the sides thereof, and the sound reproduced is very much improved if these undesirable vibrations can be eliminated.

The object, therefore, of my invention is to
35 provide such a construction in connection with the diaphragm of a sound-box as to overcome these objections.

A further object of my invention is to provide such a construction in the stylus-bar of the sound-box and the fulcrum pivot thereof
40 that the parts will be made more efficient in action, simple in construction, and more durable in their wearing qualities.

For a full, clear, and exact description of
45 one embodiment of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a central longitudinal sectional view of a sound-box, showing my improvements applied thereto. Fig. 2 is a similar view to Fig. 1, but showing the diaphragm and stylus-bar separated from the sound-box. Fig. 3 is a plan view of the

diaphragm-casing, showing the manner of
55 pivoting the stylus-bar thereto, part of the casing being broken away; and Fig. 4 is an elevation of a stylus-bar separated from the sound-box, parts thereof being shown in section.
60

Referring to the drawings, the numeral 1 indicates the tubular portion of the sound-box casing, which is adapted to be connected with the sound-conveying means or amplifying-horn and to the outer cylindrical part
65 of the casing thereof. The tubular portion 1 terminates in a disk-shaped portion 3, between which and the end of the cylindrical casing 2 the diaphragm 4 is retained, suitable gaskets 5 being inserted between said diaphragm and the adjacent portions of the casing.
70 The stylus-bar 6 is fulcrumed or pivoted upon the cylindrical portion 2 of the casing by means of a torsion-spring 7, which is provided with three annular rings or eyes, as indicated at 8, 9, and 10. The central eye
75 9 is secured to the stylus-bar 6 in the following manner: Said stylus-bar 6 is bored or drilled transversely, as shown in Fig. 4, and the pin 11 secured in the hole formed thereby in any
80 suitable manner, as by brazing or soldering or by producing a driving fit. The stylus-bar is then bored centrally to receive the stylus 12, said bore passing transversely through the pin 11. Said pin 11 is then bored
85 centrally and the hole formed thereby screw-threaded to receive the thumb-screw 13. The central eye 9 of the torsion-spring 7 is then placed over the projecting end of the pin or plug 11 and said pin headed down or riveted, so as to hold said eye in position. The eyes 8 and 10 are then secured to the cylindrical portion of the sound-box casing in the usual manner by screws 14 and 15.

The central part of the diaphragm 4 is cut
95 away to form a circular opening 16, within which is placed a conical hollow piece of metal 17, which has an annular flange 18, carried by its larger end, said flange being secured to the diaphragm 4 in any suitable
100 manner; such as by cement or by other means. Attached to the apex of the cone 17 and extending interiorly through the same is a small connecting rod or wire 19, the opposite end of which is attached to the stylus-bar 6 in any suitable manner, but in this instance by means of the screw 20.

It will now be seen that I have provided

the center of the diaphragm with a substantially unyielding rigid body, which causes the vibrations transmitted thereto by the stylus-bar to be distributed over a greater area than would be the case when the stylus-bar is connected directly with the center of the diaphragm. This construction not only produces a great improvement in the quality, softness, and mellowness of the sound produced by the diaphragm, but also a much longer connection between the end of the stylus-bar and the diaphragm, whereby the stylus-bar is allowed to oscillate about its fulcrum much more freely and with less tendency to cause the vibrations to be delivered to the diaphragm at an oblique angle.

By attaching the torsion-spring 7 to the stylus-bar in the manner described I have provided means for holding said spring much more securely and firmly in position than heretofore, while at the same time the parts are easy to manufacture and more efficient in action.

Having thus described my invention, it will be obvious that certain changes may be made in form, proportion, and arrangement of parts without departing from the spirit and scope of my invention; but what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a sound-box for talking-machines, the combination with a diaphragm provided with an opening, of a hollow conical flanged body having its flanges secured to the edge of the opening in said diaphragm to render the center of said diaphragm insensible to non-sinusoidal vibrations.

2. In a sound-box for talking-machines, the combination with a diaphragm of a stylus-bar located on one side of said diaphragm, and a rigid hollow conical body attached to the central portion of said diaphragm and having its apex in the opposite side of said diaphragm, and a connection between said stylus-bar and the apex of said conical body.

3. In a sound-box for talking-machines, the combination with a diaphragm and stylus-bar located on one side of said diaphragm, of a rigid hollow conical body having its apex on the opposite side of said diaphragm and having a flange at its base by which it is attached to the diaphragm and a flexible connection between said stylus-bar and the apex of said conical body.

4. In a sound-box for talking-machines, the combination of a stylus-bar and with a diaphragm provided with an opening, located on one side of said diaphragm, and a rigid hollow conical body projecting through said opening with its apex on that side of the diaphragm opposite to that on which said

stylus-bar is located, and a connection passing through said hollow body attached to said stylus-bar and to said hollow body.

5. In a sound-box for talking-machines, the combination with a diaphragm provided with an opening, the stylus-bar located on one side of said diaphragm, and a rigid hollow conical body projecting through said opening with its apex on that side of the diaphragm opposite to that on which the stylus-bar is located, said body having an annular flange which is attached to said diaphragm, and a connection passing through said hollow body, attached to said stylus-bar and to the apex to the said hollow body.

6. In a sound-box for talking-machines, the combination with a plane diaphragm of a stylus-bar located on one side of said diaphragm, and a rigid hollow conical body attached to the central portion of said diaphragm with an apex on that side of the diaphragm opposite to that on which the stylus-bar is located, and a flexible connection between said stylus-bar and said conical body.

7. In a sound-box for talking-machines, the combination with the stylus-bar thereof, of a pivoting member having a central opening, a pin passing through said opening and the stylus-bar, the central opening for the stylus passing transversely through said pin.

8. In a sound-box for talking-machines, the combination with the stylus-bar thereof, of a pivoting member bearing a central opening therein, a pin extending through said opening and secured in an opening in the stylus-bar, the socket in said stylus-bar for the stylus passing transversely through said pin, and a thumb-screw passing longitudinally through said pin for retaining the stylus in position.

9. In a sound-box for talking-machines, with a stylus-bar thereof, of a torsion-spring having a central eye, a pin passing through said eye and through an opening in the stylus-bar, said torsion-spring also having terminal eyes which are adapted to be secured to the sound-box casing.

10. In a sound-box for talking-machines, the combination with the stylus-bar thereof, of a torsion-spring having a central eye and terminal eyes, and a pin passing through said central eye and through an opening in the stylus-bar, said pin being headed over on said eye, the stylus-socket being arranged to pass transversely through said pin.

In witness whereof I have hereunto set my hand this 10th day of November, 1904.

JOHN C. ENGLISH.

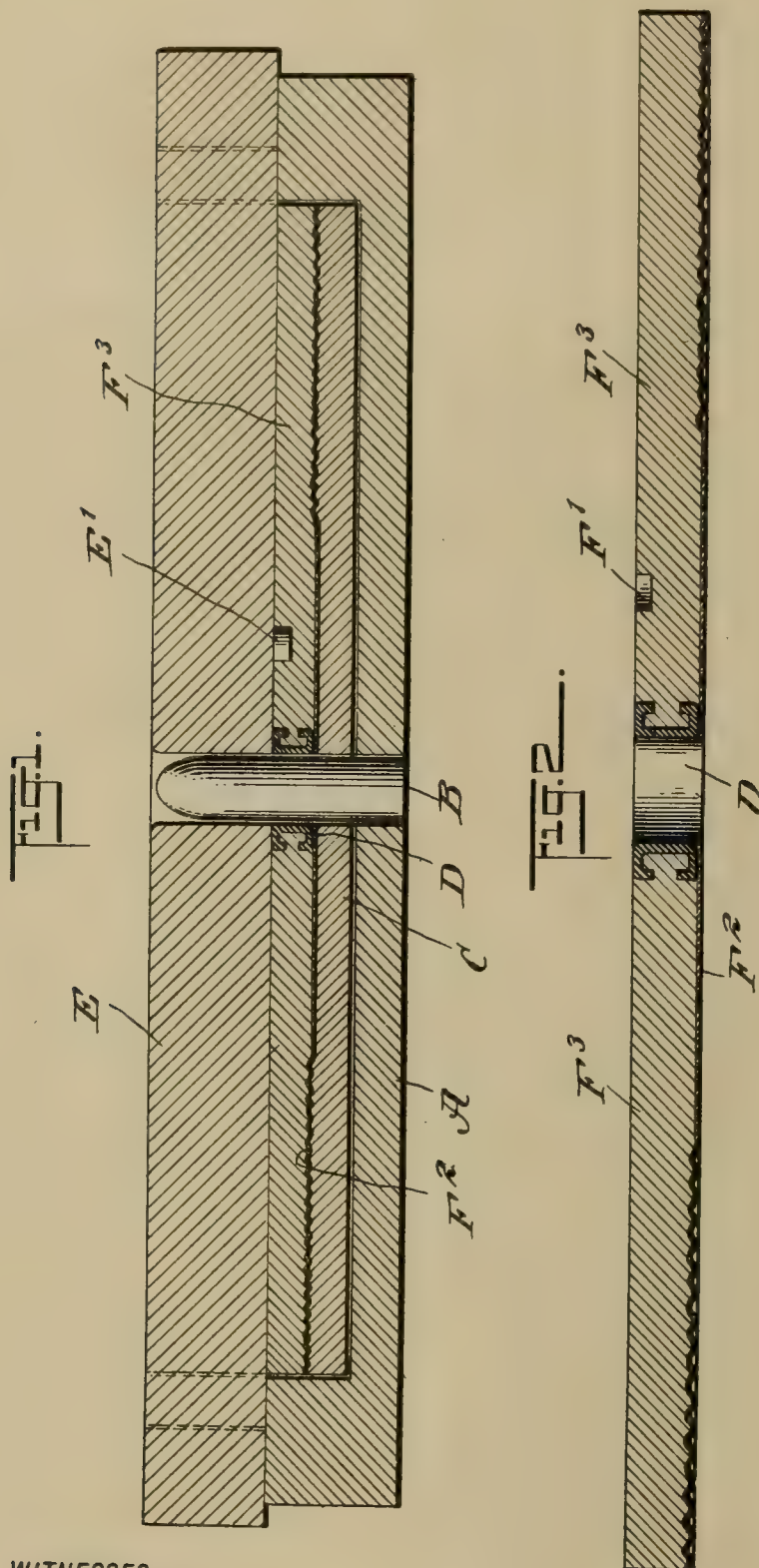
Witnesses:

JOHN F. GRADY,
HARRY COBB KENNEDY.

W. H. HOYT.

PROCESS FOR PRODUCING FLAT MOLDED SOUND RECORDS.

APPLICATION FILED JUNE 9, 1903.



WITNESSES:

Julius H. Lutz

John Lutz

INVENTOR

William H. Hoyt

BY

Bremer & Ansell
his ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM H. HOYT, OF WYOMING, NEW JERSEY.

PROCESS FOR PRODUCING FLAT-MOLDED SOUND-RECORDS.

No. 828,604.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed June 9, 1903. Serial No. 160,733.

To all whom it may concern:

Be it known that I, WILLIAM H. HOYT, a citizen of the United States, and a resident of Wyoming, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes for Producing Flat-Molded Sound-Records, of which the following is a specification.

My invention relates to the manufacture of molded disk records, such as are used for some talking-machines.

The object of my invention is to provide an improved process of producing such records, whereby they will be given great strength and durability.

In the accompanying drawings I have illustrated an apparatus such as may be used in producing a talking-machine record according to my invention, Figure 1 being a sectional elevation of such apparatus with the record in process of formation, and Fig. 2 is a cross-section of the completed article.

The apparatus, for which I do not claim any novelty in the present application, consists of a body A, provided with a pin B for centering the matrix-disk C and the bushing D, which I prefer to employ as a lining at the central aperture of the record. The pin B also forms a guide for the pressure-plate E, which is adapted to engage the upper surface of the record in process of molding same.

E' is a pin for producing the customary eccentric recesses F' in the record F.

Hitherto it has been customary to make the record from a homogeneous plastic composition, which was molded by being pressed into the irregularities upon the upper surface of the matrix C. According to my present invention after preparing a suitable plastic mixture and putting the same in a viscous or molten condition into a heated mold on top of the matrix disk C, as indicated at F², I superimpose a backing of suitable material—such as linen, cardboard, or papier-mâché board—and then put this mold and the contents in a hydraulic or other press to force the top plate E against the material for the record. The composition or plastic mass should form only a comparatively thin layer, the thickness of the backing being much

greater than that of the composition, which therefore forms a covering or lining for the backing. By this procedure I secure an impression of the irregularities of the matrix not only into the lining or facing F², but into the adjacent portion of the backing F³ as well. This is shown with particular clearness in Fig. 2. The connection of the facing with the backing is thus rendered very strong, inasmuch as the said elements are provided with interlocking projections.

The article resulting from the above-described process can be made considerably thinner than a record made exclusively from plastic composition and is much lighter in weight, stronger, and more durable than similar articles as produced hitherto.

While pressure is being applied to mold the article I also cool the plastic mass, as by water circulation, so as to bring about a rapid hardening and solidification of the mass.

I claim as my invention—

1. The herein-described process of producing flat-molded sound-records, which consists in interposing a thin, substantially plane plastic facing between a yielding, less plastic backing and a substantially flat record-matrix, and exerting pressure so as to impress the irregularities of the matrix not only into the facing, but into the adjacent portion of the backing.

2. The herein-described process of producing flat-molded sound-records, which consists in interposing, under the application of heat, a thin substantially plane plastic facing between a flat record-matrix and a yielding, less plastic backing of materially greater thickness than said facing, and then applying a cooling influence to cause the facing to harden, and at the same time pressure to cause the irregularities of the matrix to impress themselves into the facing and into the adjacent portions of the backing.

3. The herein-described process of producing flat-molded sound-records, which consists in applying a thin, substantially plane plastic facing on top of a flat record-matrix, then applying a yielding, non-brittle and less plastic backing on top of said facing, applying a downward pressure to the backing so as

to cause the facing to conform to the irregularities of the matrix, and the rear surface of the facing, under the influence of said irregularities of the matrix, to assume irregularities which are impressed into the face of said
5 backing, and then solidifying the facing and removing the pressure.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. HOYT.

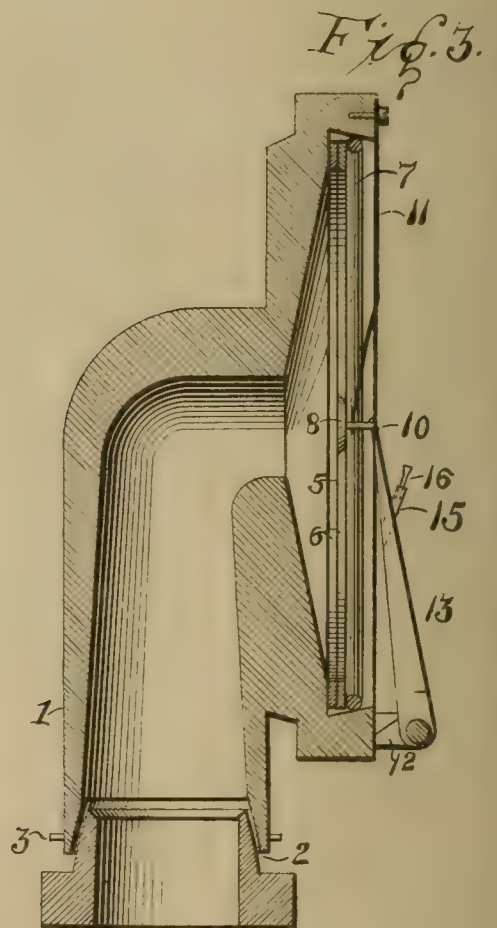
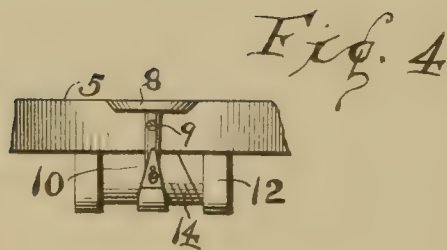
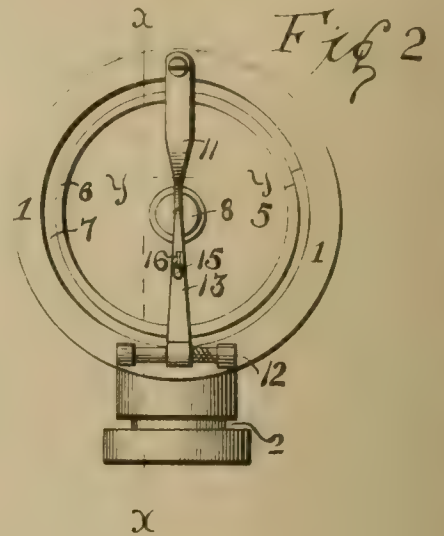
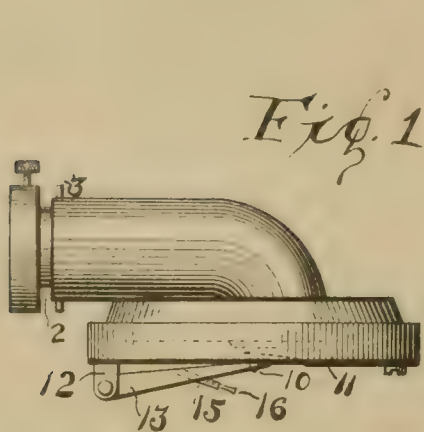
Witnesses:

FREDK. H. BECKWITH,
MOSS. ED. JACKSON.

No. 828,836.

PATENTED AUG. 14, 1906.

H. R. BROCIUS.
REPRODUCER FOR GRAPHOPHONES.
APPLICATION FILED JULY 1, 1904.



Witnesses
E. J. Vechnreyer
E. L. Rowzee

Inventor
HARVEY R. BROCIUS.
Edoan Bros
Attorney

UNITED STATES PATENT OFFICE.

HARVEY R. BROCIUS, OF SUMMERVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JAMES A. HAVEN, OF SUMMERVILLE, PENNSYLVANIA.

REPRODUCER FOR GRAPHOPHONES.

No. 828,836.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed July 1, 1904. Serial No. 214,982.

To all whom it may concern:

Be it known that I, HARVEY R. BROCIUS, a citizen of the United States, residing at Summerville, in the county of Jefferson and State of Pennsylvania, have invented certain new and useful Improvements in Reproducers for Graphophones; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to reproducers or sound-boxes for graphophones particularly adapted for use on hard-mold cylinder-records, such as the Edison or Columbia.

The invention consists of the details of construction and combination of parts hereinafter described, and more particularly pointed out in the claims.

In the accompanying drawings, illustrating the preferred embodiment of my invention, Figure 1 is a side view. Fig. 2 is a plan view looking at the diaphragm. Fig. 3 is an enlarged sectional view on line *x x* of Fig. 2. Fig. 4 is an enlarged broken sectional view on line *y y* of Fig. 2, showing the manner in which the sounder-arm engages the stud or pin secured to the diaphragm; and Fig. 5 is an enlarged view of the sapphire point.

Referring more particularly to the drawings, 1 is the sound-box, which is made of hard rubber or aluminium, preferably the latter, and is of the ordinary general shape and size. Said sound-box is preferably provided with a ball-joint 2 for connection with the graphophone-carriage and has a pin 3 for holding said ball-joint in place. The walls or rim around the other open end of the sound-box are preferably beveled inwardly, as at 4. The glass diaphragm 5 is arranged between two washers 6 and is held in place by a spring 7, which engages the beveled walls above described. Near the center of said diaphragm is secured a stud or pin 8, which has a small hole 9 transversely therethrough, while its outer end is niched or grooved, as at 10. A flat equalizing-spring 11, fastened at one end to the rim of the frame, is pointed at the other end, where it engages the opening 9 in said stud or pin. Also secured to the rim of said body portion, preferably opposite where said spring is fastened, two short arms 12 project outwardly,

and between them is pivotally mounted a cross-pin carrying the stylus-lever 13, which extends over the diaphragm and has its extremity adapted to engage the niche or groove in the stud or pin 8. Said lever is held firmly upon said stud or pin by means of a coiled spring 14, wrapped around said cross-pin and having one end thereof engaging said lever and the other one of said short arms 12. A short arm 15, hollow at one end to receive the sapphire point or tracing-stylus 16, is secured to the lever 13 at an acute angle with the end bearing upon the stud or pin 8. Said sapphire point or stylus is preferably shaped as shown in Fig. 5, having its record-engaging end made in the form of a truncated cone, with its extremity as the base of the cone.

It has been found that the style of sapphire point or stylus just described is easier on the record and will not reproduce cracks or scratches on said records as plainly as the makes now in use. The arm 15 being arranged at an angle with the lever 13 allows the stylus to ride smoothly over the record.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sound-box for graphophones having the inner walls of the rim round its diaphragm-receiving depression beveled inwardly, a diaphragm arranged in said depression, a spring adapted to engage the inner beveled walls of said rim to retain said diaphragm in place, a stylus-lever, and means to connect said lever to said diaphragm.

2. In a sound-box for graphophones having a diaphragm, a stud or pin secured to said diaphragm, a stylus-lever pivotally connected to said sound-box and adapted to bear upon said stud, an equalizing-spring fastened at one end to said sound-box and at the other end engaging said stud between said lever and diaphragm, and means to retain said lever in contact with said stud.

3. A sound-box for graphophones, having a diaphragm, a stud or pin secured to said diaphragm, said stud or pin having a perforation transversely therein, an equalizing-spring fastened at one end to said sound-box and at the other end engaging the perforation in said stud, a stylus-lever pivotally connected to said sound-box and adapted to bear upon said stud, said lever carrying a

stylus, and means to retain said lever in contact with said stud.

4. A sound-box for graphophones having a diaphragm, a stud or pin secured to said diaphragm, said stud or pin having a niche or groove in its end, a stylus-lever pivotally connected to said sound-box and having its extremity adapted to bear in said niche or groove in said stud, an equalizing-spring for said stud or pin arranged between said lever and diaphragm, and means to retain said lever in contact with said stud.

5. A sound-box for graphophones, having a diaphragm, a stud secured to said diaphragm, said stud having a perforation transversely therein and a niche or groove in its end, an equalizing-spring fastened at one end to said sound-box and its other end engaging the perforation in said stud, a stylus-lever pivotally connected to said sound-box and having its extremity adapted to bear in said niche or groove in said stud, said lever

carrying a stylus, and means to retain said lever in contact with said stud.

6. A sound-box for graphophones, having a diaphragm, a stud or pin secured to said diaphragm, said stud having a transverse perforation and a niche or groove in its end, a flat spring secured at one end to said sound-box and its other end reduced in width and engaging the perforation in said pin, a stylus-lever pivotally connected to said frame with its end adapted to bear in said niche or groove in said stud, means to retain said lever in contact with said stud, and a stylus-carrying arm fixed to said lever and forming an acute angle with the end of said lever which bears upon said stud.

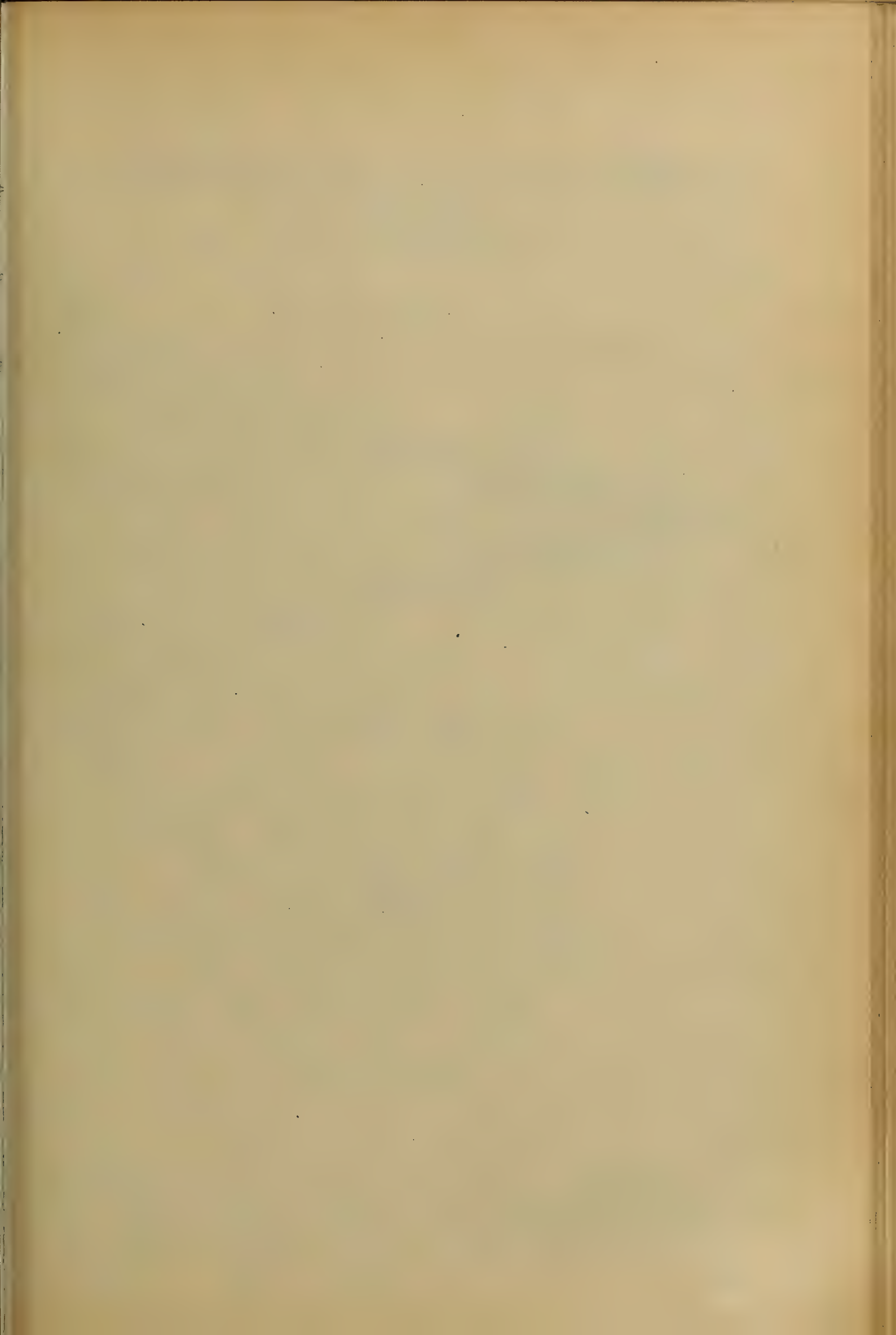
In testimony whereof I affix my signature in presence of two witnesses.

HARVEY R. BROCIUS.

Witnesses:

H. D. CLARK,

I. B. McLAUGHLIN



No. 829,066.

PATENTED AUG. 21, 1906.

W. S. FERNAN.
PHONOGRAPH HORN.
APPLICATION FILED JAN. 15, 1906.

Fig: 1.

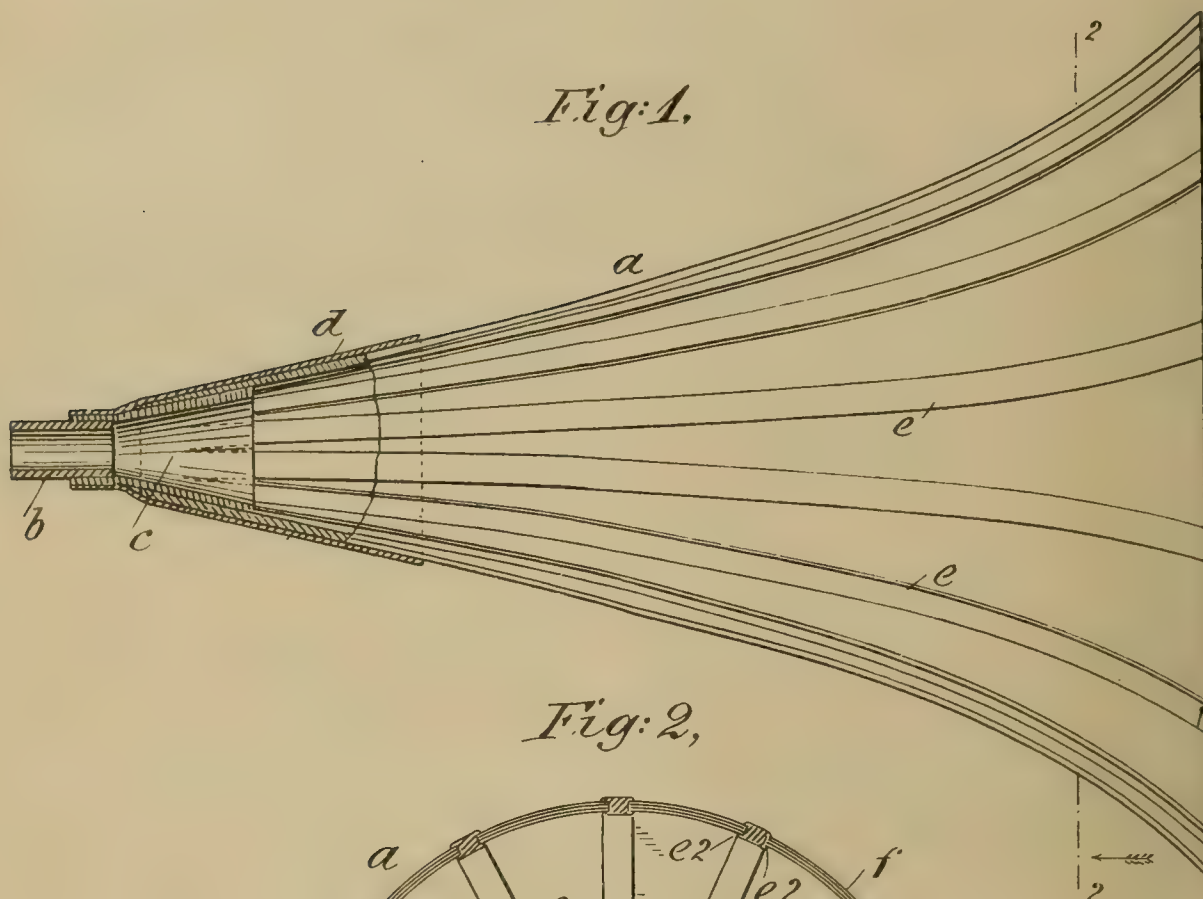
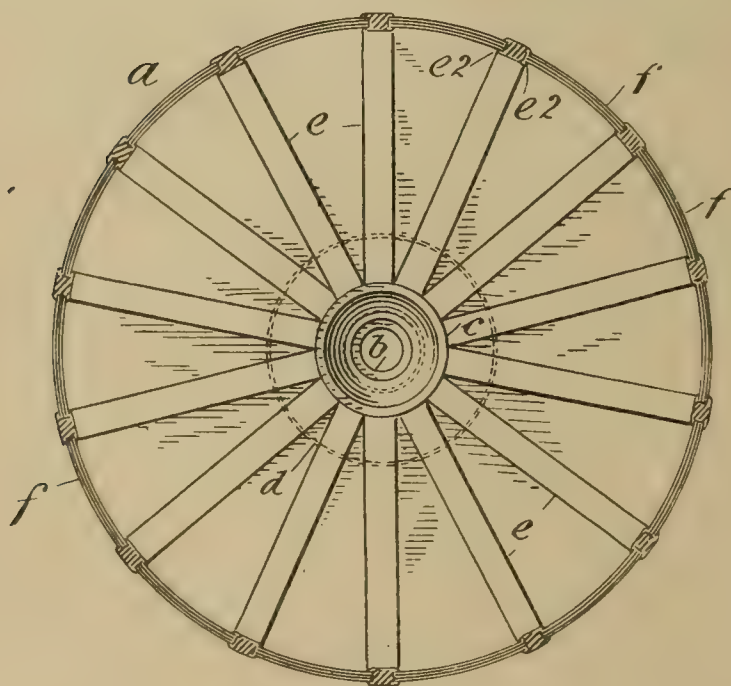


Fig: 2,



WITNESSES

Ernest Hagony.
J. A. Stewart

INVENTOR

BY HIS

Walter S. Fernan
Edgar Tate & Co
ATTORNEYS

UNITED STATES PATENT OFFICE.

WALTER S. FERNAN, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 829,066.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed January 15, 1906. Serial No. 296,076.

To all whom it may concern:

Be it known that I, WALTER S. FERNAN, a citizen of the United States, residing at New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

10 This invention relates to the delivery-horns of phonographs and other machines of this class; and the object thereof is to provide a delivery-horn for machines of the class specified which will do away with the mechanical, 15 harsh, and metallic sounds usually produced in the operation of such machines and also produce a full, even, and continuous volume of sound in which the articulation is clear, full, and distinct, a further object being to 20 provide a horn of the class specified which is made entirely of wood or other fibrous material; and with these and other objects in view the invention consists in a horn of the class specified constructed as hereinafter described 25 and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated 30 by suitable reference characters in each of the views, and in which—

Figure 1 is a side view, partly in section, of my improved delivery-horn for phonographs and similar machines, and Fig. 2 a transverse 35 section of the horn on the line 2 2 of Fig. 1.

In the practice of my invention I provide a delivery-horn *a* for phonographs and other talking-machines or music-reproducing machines provided at its smaller end with the 40 usual nozzle-piece *b*, by means of which connection is made with the machine in the usual manner, and in the form of construction shown a supplemental horn-piece *c* is employed between the body portion of the horn 45 and the nozzle-piece *b* and in which the nozzle-piece *b* is secured, the supplemental piece serving as means for connecting the body portion of the horn with the nozzle-piece, and the smaller end of the horn is also provided 50 with a shield or covering *d*, which extends, in the form of construction shown, from the smaller end of the piece *c* a predetermined

distance along the smaller end of the horn and serves as a reinforcement therefor.

The body portion of the horn is composed 55 of a plurality of longitudinal ribs *e*, separated by tapering spaces which gradually widen from the smaller end to the larger end of the horn, and these spaces are filled in with web members *f*, composed of a plurality of layers 60 of wood or other fibrous material secured together, and the edges of the said web members fit in grooves *e*², formed in the opposite sides of the rib members *e*. In the form of construction shown the web members *f* are 65 composed of three separate layers of material; but it will be apparent that other numbers of layers of material may be employed, and the said layers of material are in practice, if more than one layer be employed, 70 secured together before the said web members are secured in place between the ribs *e*.

All the parts of my improved horn, including the nozzle-piece *b*, the short tube member *c*, and the shield or covering *d*, are composed 75 of wood or other fibrous material, and my invention is not limited to the use of the part *c*; but I prefer to use said part, as it forms a reinforcement and strengthening device for the smaller end of the horn. 80

A horn made in this manner will not produce the harsh metallic and other objectionable sounds usually produced by the delivery-horns of instruments or machines of the class specified, and changes in and modifica- 85 tions of the construction described may be made without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, what I claim as new, and desire to secure by Letters 90 Patent, is—

1. A delivery-horn for phonographs and similar machines, the body portion of which is composed of longitudinal ribs having oppositely-disposed side grooves, and tapering 95 webs secured in said grooves, substantially as shown and described.

2. A delivery-horn for phonographs and similar machines, the body portion of which is composed of longitudinal ribs having oppositely-disposed side grooves, and tapering 100 webs secured in said grooves, said webs being composed of separate layers of material, substantially as shown and described.

3. A delivery-horn for phonographs and
similar machines, the body portion of which
is composed of longitudinal ribs having oppo-
sitedly-disposed side grooves, and tapering
5 webs secured in said grooves, said ribs and
said webs being composed of fibrous material,
substantially as shown and described.

In testimony that I claim the foregoing as

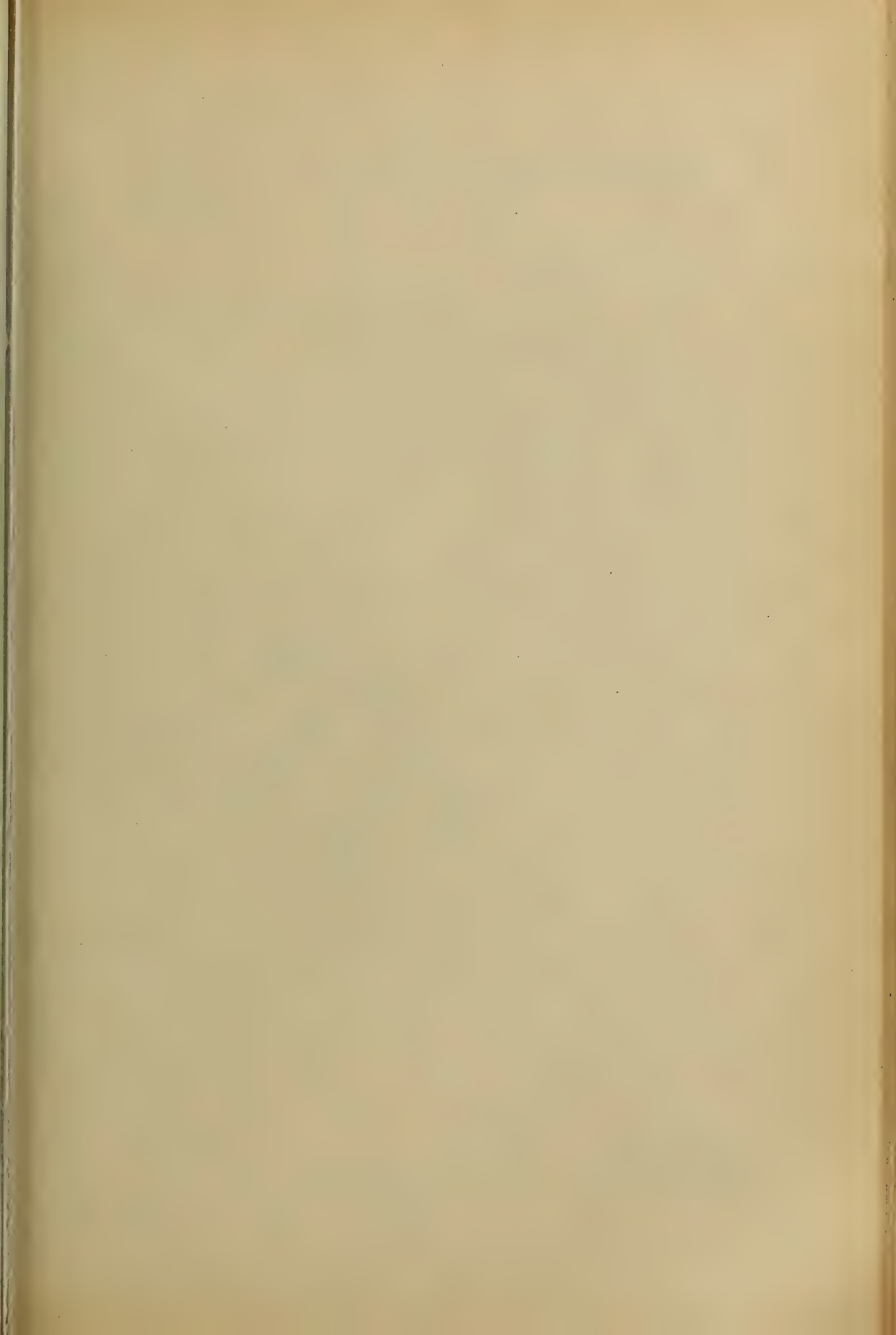
my invention I have signed my name, in pres-
ence of the subscribing witnesses, this 13th 10
day of January, 1906.

WALTER S. FERNAN.

Witnesses:

F. A. STEWART.

C. E. MULREANY



No. 829,123.

PATENTED AUG. 21, 1906.

A. N. PIERMAN.

FRICTIONAL REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED APR. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

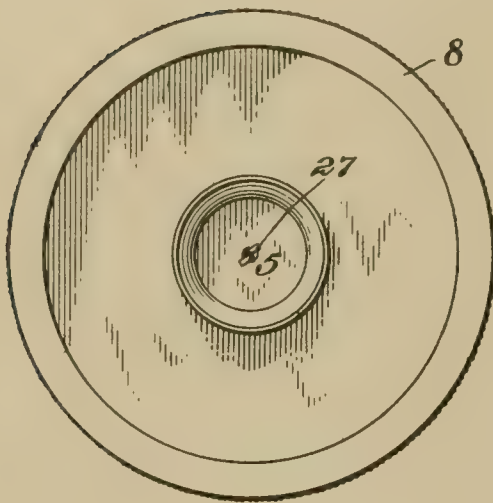
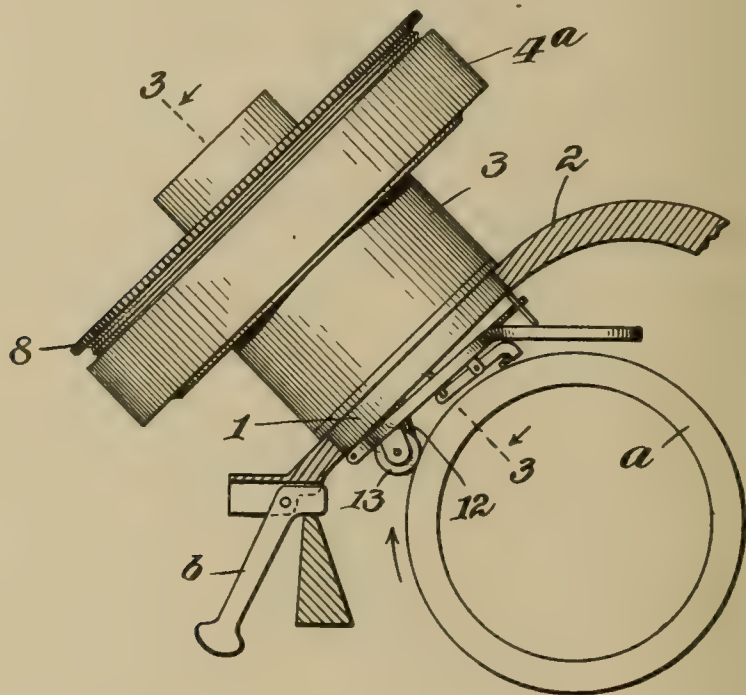


Fig. 2.



Attest:
Edgworth Greene
Delos Holden

Inventor:
Alexander A. Pierman
by *Frank L. Spear* Atty.

A. N. PIERMAN.

FRICTIONAL REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED APR. 26, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

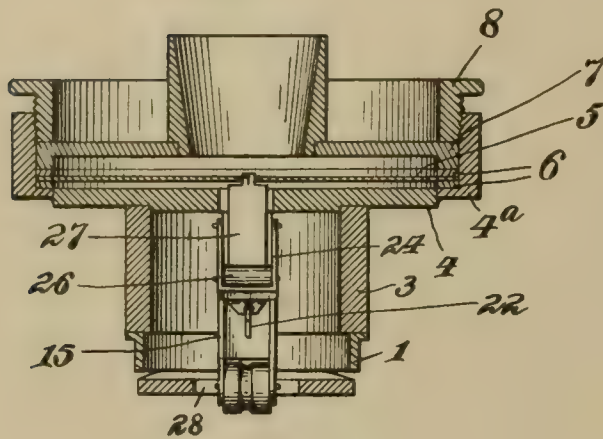


Fig. 5.

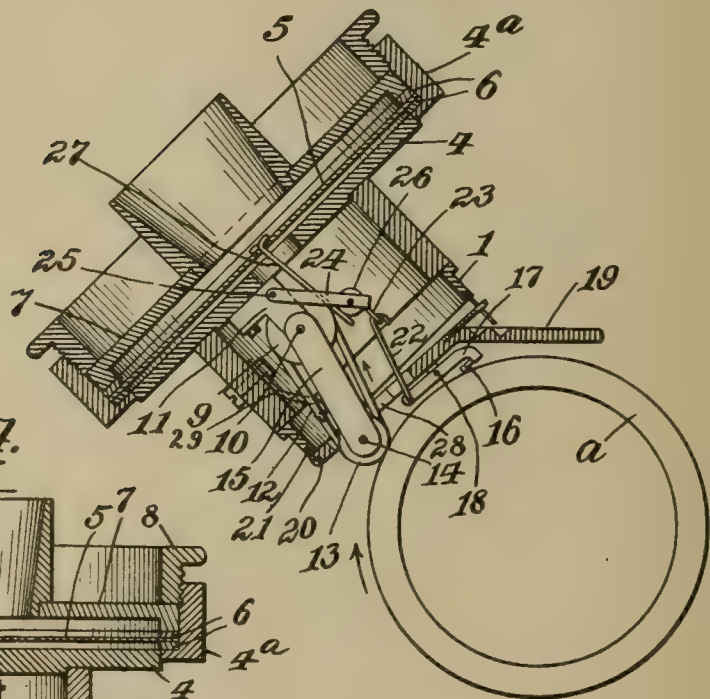
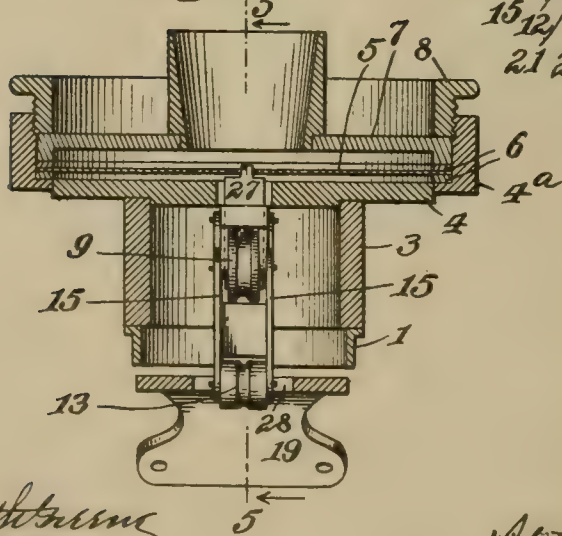


Fig. 4.



Attest:
Edgetworth
De los Anden

Inventor:
Alexander N. Pierman
by Frank C. Squire, Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FRICTIONAL REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

No. 829,123.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed April 26, 1905. Serial No. 257,560.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Frictional Reproducing Attachments for Phonographs, of which the following is a description.

My invention relates to reproducing attachments for phonographs of the type wherein a friction-wheel is positively driven, and by a frictional connection between said wheel and the diaphragm the latter is put under stress, so that by providing suitable mechanism operated by the reproducing-stylus for varying the amount of friction the diaphragm will be thrown into vibration in accordance with the movements of the stylus, and thereby reproduce the sounds represented by the sound-waves of the phonographic record on which the stylus travels. Apparatus operating upon this general principle is well known in the art, being disclosed in British patents to Hope-Jones, No. 15,245 of 1890, and to St. George, No. 3,473 of 1880.

My invention has for its object the provision of apparatus of this character in which the diaphragm, friction-wheel, reproducer-stylus, and connecting parts are carried by a frame or support which is capable of being inserted and held in the sound-box carrier-arm of an ordinary phonograph.

Reference is hereby made to the accompanying drawings, in which—

Figure 1 is a plan view of the improved attachment. Fig. 2 is a side elevation showing my improved attachment in operative position with respect to a phonograph-record and showing also in section the sound-box carrier-arm of a phonograph and the support for the forward end of the same. Fig. 3 is a section on line 3 3 of Fig. 2 viewed in the direction of the arrows. Fig. 4 is a section on line 3 3 of Fig. 2 viewed in the direction opposite to the arrows. Fig. 5 is a section on line 5 5 of Fig. 4.

Corresponding parts are indicated by the same reference characters in the several views.

The improved attachment comprises a flanged ring 1 of a size suitable for fitting within the sound-box carrier-arm 2 of an ordinary phonograph, in which it may be securely held by a set-screw in the usual man-

ner. Carried by the ring 1 is a supporting frame or body comprising a cylinder 3, disk 4, and an internally-threaded ring 4^a. Within the said ring the diaphragm 5 is clamped between rubber gaskets 6 6 in the usual manner by means of the flanged plate 7 and screw-threaded ring 8. A friction-wheel 9, of amber or other suitable material, is mounted on a pin or spindle 10, journaled in a bracket 11, which is secured to the bottom of the disk 4. The friction-wheel 9 is circumferentially grooved to receive a driving-belt 12, which derives its power from a grooved friction-roller 13, carried on a spindle 14, which is supported by the free end of the floating frame 15. The upper end of the frame 15 is loosely mounted on the pin 10, and the roller 13 normally rests against the surface of the sound-record *a* when the device is in operative position, being pressed against said surface by the spring 29. The frame 15 is inclined with respect to the surface of the record *a*, so that the rotation of the same in the direction indicated by the arrow, Figs. 2 and 5, tends to increase the pressure of the roller 14 on the surface of the record, whereby a good driving contact is secured for the friction-roller. A reproducer-stylus 16 is carried at one end of a lever 17, which is pivoted at 18 to a lug projecting downward from the weight 19. The latter is pivoted at 20 to a pin 21, carried by the ring 1, and is apertured at 28 for the passage of the driving-roller 13 and belt 12. The end of the lever 17 which is opposite the stylus 16 is connected, by means of a link 22, with an eye 23, secured to a lever 24. The latter lever is pivoted at 25 to the bracket 11 and carries at its free end a roller 26. Between the roller 26 and the friction-wheel 9 is a friction-plate 27, whose upper end is formed with shoulders which abut against the lower face of the diaphragm and tongues which pass through the same and are bent over upon its upper face, (see Fig. 3,) whereby it is secured to the diaphragm 5. When the carrier-arm 2 is in its depressed position, as shown in Fig. 2, the stylus 16 will be in engagement with the record-groove of the phonogram *a* and the roller 13 will rest upon the surface of the record. On operating the lift-lever *b* the arm 2 will be elevated, and both the stylus 16 and roller 13 will be clear of the surface of the phonogram. In other

words, my attachment will be thrown into and out of operation in exactly the same manner as an ordinary phonograph-reproducer.

The operation of the device is as follows:

5 The lift-lever *b* being operated to lower the stylus 16 into engagement with the rotating phonogram *a*, the roller 13 is simultaneously brought into driving engagement with the surface of the said phonogram and by means
10 of the belt 12 drives the friction-wheel 9. The friction-wheel exerts a thrust upon the plate 27, and thereby places the diaphragm 5 under elastic stress. The amount of stress is varied by the up-and-down movement of
15 the roller 26, controlled by the stylus 16 through the lever 17 and link 22, so that when the link 22 is drawn downward the roller 26 presses against the plate 27 and increases the amount of friction between said
20 plate and the wheel 9, thereby increasing the thrust upon the diaphragm. When the link 22 is moved upward, the roller 26 is carried away from the plate 27, thereby decreasing the friction between the wheel 9 and plate 27
25 and allowing the diaphragm to move toward its normal position. The diaphragm is thus caused to respond accurately to the minute movements of the stylus 16 produced by the elevations and depressions of the record-
30 groove of the sound-record or phonogram *a*.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In an apparatus of the character described, a rotating sound-record, a sound-box carriage traveling transversely to the direction of rotation thereof, and a friction-wheel carried by the carriage and driven by the surface of the sound-record, substantially as set forth.

2. In an apparatus of the character described, a rotating sound-record, a diaphragm-support and diaphragm traveling transversely to the direction of rotation thereof, a rotating frictional element driven by the surface of the sound-record and a co-operating frictional element connected to the diaphragm, substantially as set forth.

3. In an apparatus of the character described, a rotating sound-record, a diaphragm-support and diaphragm traveling transversely to the direction of rotation thereof, a rotating frictional element driven by the surface of the sound-record, a co-operating frictional element connected to the diaphragm and a stylus engaging the sound-record and connected to the last-mentioned frictional element, substantially as set forth.

4. In an apparatus of the character described, a sound-record, a diaphragm-support and diaphragm, means for producing rotation of the sound-record and relative movement of the sound-record and diaphragm-support in a direction transverse to

the direction of rotation of the sound-record, and a friction-wheel driven by the surface of the sound-record, substantially as set forth.

5. In an apparatus of the character described, a sound-record, a diaphragm-support and diaphragm, means for producing rotation of the sound-record and relative movement of the sound-record and diaphragm-support in a direction transverse to the direction of rotation of the sound-record, a friction-wheel driven by the surface of the sound-record and a frictional element connected to the diaphragm and co-operating with said friction-wheel, substantially as set forth.

6. In an apparatus of the character described, a sound-record, a diaphragm-support and diaphragm, means for producing rotation of the sound-record and relative movement of the sound-record and diaphragm-support in a direction transverse to the direction of rotation of the sound-record, a friction-wheel driven by the surface of the sound-record, a frictional element connected to the diaphragm and co-operating with the friction-wheel and a stylus engaging the sound-record and connected to the said co-operating frictional element, substantially as set forth.

7. In an apparatus of the character described, a frame or support carrying a diaphragm, a friction-wheel and an apertured floating weight, said weight being provided with a reproducing-stylus, and driving means for said friction-wheel passing through the aperture of said floating weight, substantially as set forth.

8. In an apparatus of the character described, a rotating sound-record, a sound-box carriage traveling transversely to the direction of rotation thereof, a member pivotally supported by said carriage and carrying at its free end a friction-roller for engagement with the record-surface, said roller being in advance of a line drawn from the said pivot perpendicular to the record-surface, whereby the rotation of the record causes an increase of pressure of the roller upon the record, substantially as set forth.

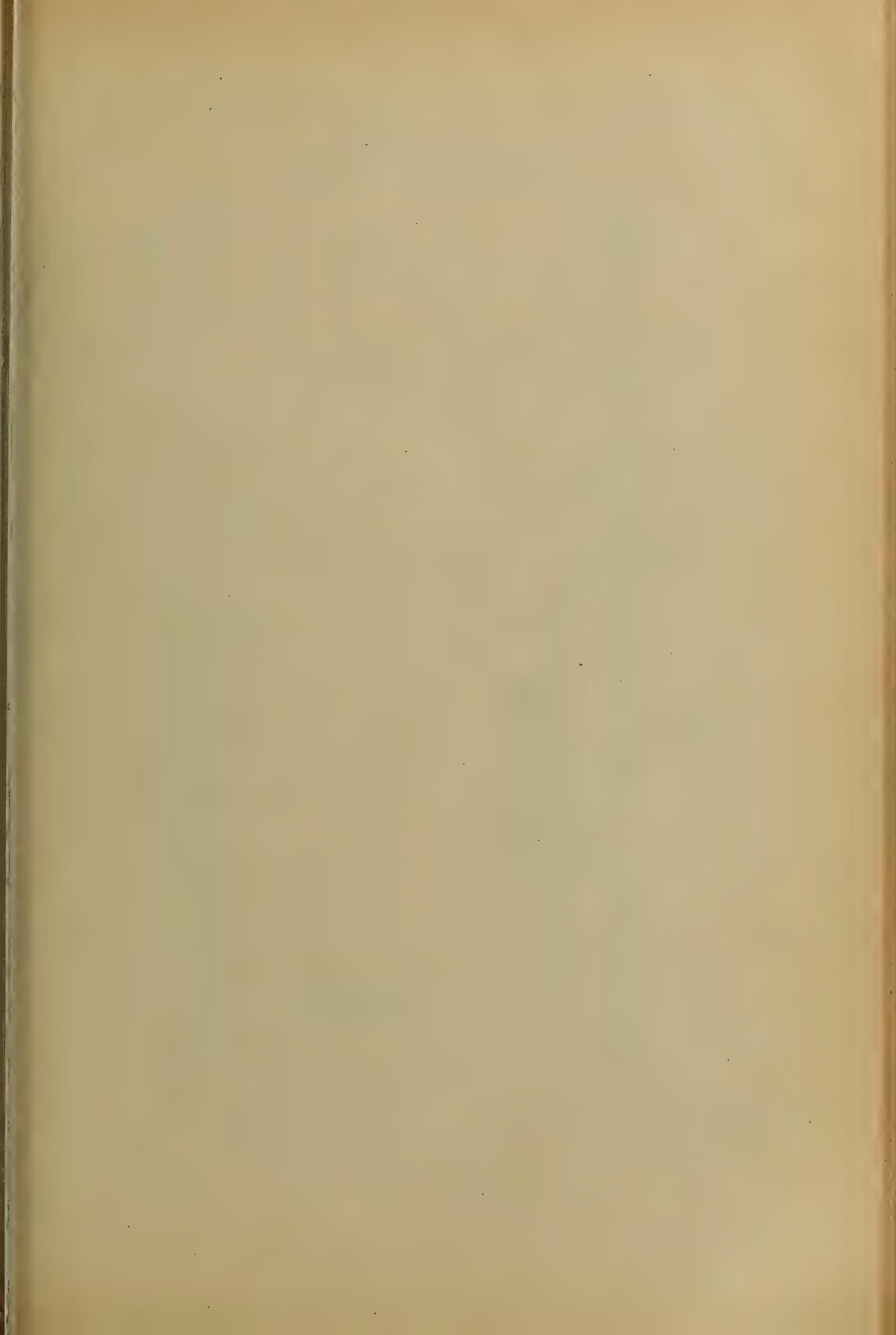
9. The combination with the speaker for talking-machines, the stylus, and the connection between said stylus and the diaphragm of said speaker, of a revoluble drum carried by said speaker in contact with said connection, and driving means for said drum adapted to be actuated by the record-cylinder.

This specification signed and witnessed this 25th day of April, 1905.

ALEXANDER N. PIERMAN.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

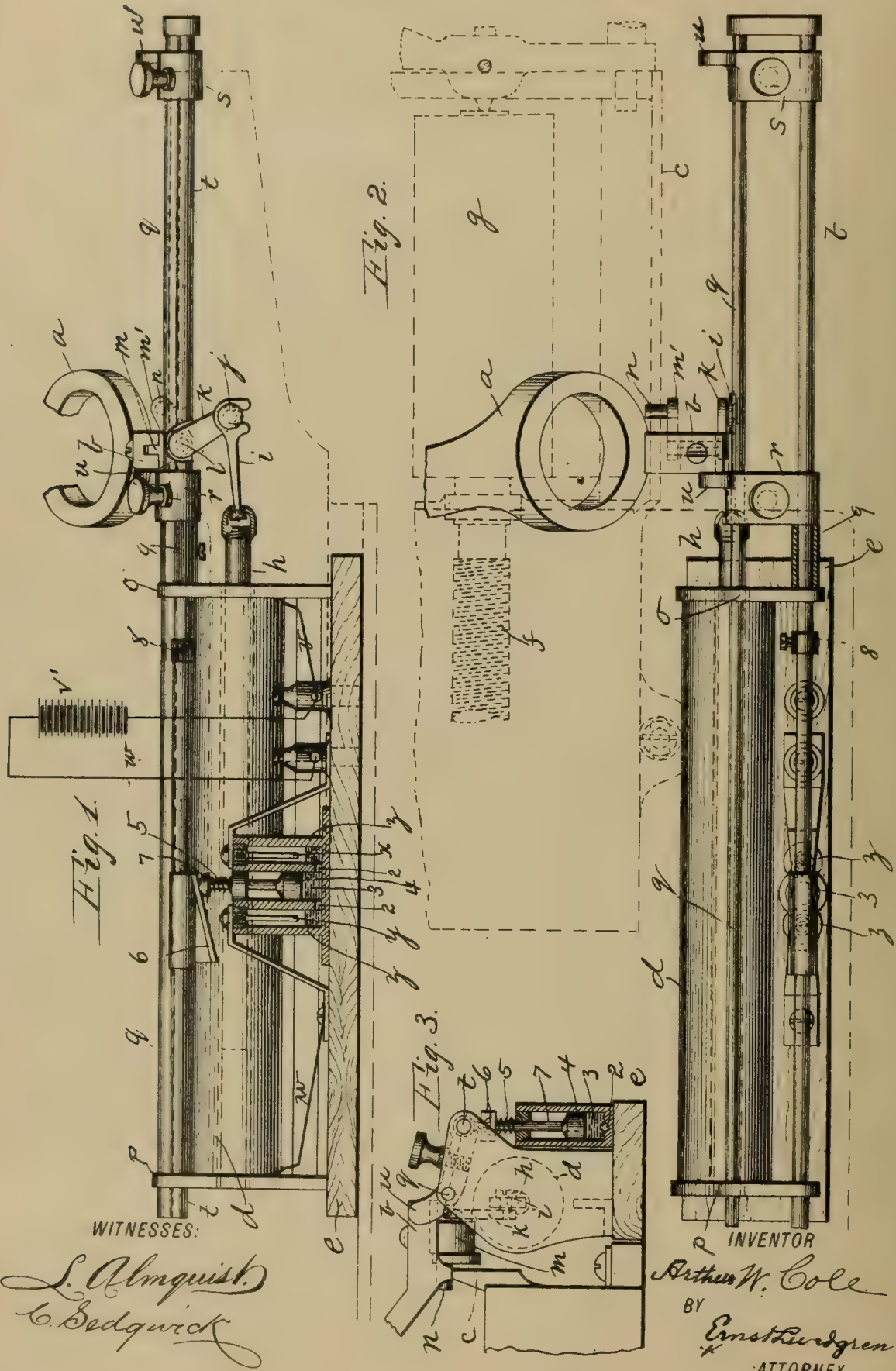


No. 829,195.

PATENTED AUG. 21, 1906.

A. W. COLE.
REVERSING GEAR FOR PHONOGRAPHS.

APPLICATION FILED MAR. 31, 1905.



WITNESSES:

L. Almqvist.
C. Sedgwick

INVENTOR

Arthur W. Cole

BY

Ernst Lundgren
ATTORNEY

UNITED STATES PATENT OFFICE.

ARTHUR W. COLE, OF WEST HOBOKEN, NEW JERSEY, ASSIGNOR OF
ONE-HALF TO JACOB VALENSI, OF NEW YORK, N. Y.

REVERSING-GEAR FOR PHONOGRAPHS.

No. 829,195.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed March 31, 1905. Serial No. 253,011.

To all whom it may concern:

Be it known that I, ARTHUR W. COLE, a subject of the King of Great Britain, and a resident of West Hoboken, Hudson county, and State of New Jersey, have invented certain new and useful Improvements in Reversing-Gear for Phonographs, of which the following is a specification.

My invention relates to means for reversing the diaphragm-carriages of phonographs; and it consists of electric carriage-retracting apparatus and automatic circuit closing and breaking devices, whereby instantaneous return of the carriage is effected with economy of time, as compared with the common return-screw device, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a front elevation of my improved carriage-reversing device with some parts of the contact devices in vertical section and with dotted lines indicating some parts of the phonograph-base. Fig. 2 is a plan view with some parts of the phonograph in dotted lines and with part of the speaker-carrying arm of the phonograph in full lines. Fig. 3 is an end elevation of the reversing apparatus with a part of the contact apparatus in vertical section and with an end view of the phonograph-slideway for the speaker-carrying arm.

So far as the phonograph is concerned it is only necessary for the illustration of my invention to show in the drawings the part *a* of the speaker-carrying arm with its attached shifter-arm *b*, dotted outlines of some of the phonograph parts, and the end view of the slideway *c* whereon said speaker-arm *a* moves in the working of the phonograph.

The reversing attachment comprises a solenoid-coil *d*, suitably mounted on a base *e* in front of the phonograph and parallel with the same, as indicated by the feed-screw *f* and cylinder *g* (dotted) of the phonograph, the core *h* of said coil being connected by a jointed hook *i* with the pin *j* of a crank *k*, the shaft of which, *l*, is mounted in a block *m*, which I attach to the under side of arm *b* and which carries another crank *m'*, this latter crank having a pin *n*, projecting from its free end and resting on the slideway *c*.

Slidably mounted in bearings at *o* and *p*, located at the extremities, respectively, of the solenoid-coil, is a shifting rod *q*, which is

coupled by clamps *r s* with a similar sliding rod *t* parallel with rod *q* in the same bearing-supports, said clamps each having a stop-lug *u'* between which the extremity of arm *b* works for closing the solenoid-circuit and for resetting the shifting rod after each return of the speaker.

The circuit closing and breaking device consists of the terminals *x* and *y* of the wire *w*, pendent in mercury-holding cups *z*, communicating with each other and with an intermediate cylinder 3 through orifices 2 at their bases, said cylinder 3 containing a plunger 4, which is normally held at the surface of the mercury or slightly above by a spring 5. The rod *t* carries an inclined piece 6 underneath it and in range of the head of rod 7 of the plunger, so that the higher part of the incline rides onto said rod when arm *b* reaches the lug *u'* of clamp *s* just prior to the finish of the movement of the speaker to the right in the process of giving audible delivery of the record and by forcing down the plunger raises the mercury in cups *z* into contact with said terminals *y*, thus closing the circuit which instantly retracts the core *h*, which swings shaft *l* upward on pin *n*, as a fulcrum resting on slideway *c*, and lifts arm *a* through the instrumentality of block *m*, attached to arm *b* and carrying shaft *l*, thus disengaging arm *a* from the phonograph feed-screw *f* and instantly pulling said arms *a* and *b* back to the starting-point, where arm *b*, coming in contact with lug *u* of clamp *r*, shifts rods *q* and *t* back, relieving plunger-rod 7 from depression by the inclined piece 6 and allowing spring 5 to lift plunger 4 and break the contact. The weight then being no longer subject to the uplifting pull of the current on the core *h* causes the drop of arm *a* and reengagement with the feed-screw *f*.

The solenoid-core is by its connection with the phonograph-carriage arm *a*, through hook *i*, crank *k*, and shaft *l*, drawn out by said carriage-arm preparatory to the retracting operation when the carriage is operated by the feed-screw *f*; but it will be noticed that the power for retracting the carriage is supplied by a separate battery *v'*, thus relieving the phonograph-power of this part of the work.

The arm *b* when the carriage reaches the end of the record contacts with and shifts the stop *s u'* and with it the rod *t* and incline 6,

so that the incline when shifted depresses the contact button or pin to close the circuit controlling the solenoid, &c. A stop 8 on rod *t* limits the out movement of the rods *q t* by contact with bearing-support *o*, and another stop 9 limits the back movement.

What I claim as my invention is-

1. The combination with a phonograph, of a phonograph-carriage-retracting device comprising a solenoid-actuator, means for energizing the solenoid, automatic circuit closing and breaking devices controlling the operation of said actuator, means for automatically disengaging the phonograph-carriage from the feed-screw when the circuit closes, and means for automatically reengaging said arm and feed-screw when the circuit breaks.

2. The combination with a phonograph, of a phonograph-carriage-retracting device comprising a solenoid-actuator, means independent of the phonograph-power for energizing the solenoid, automatic circuit closing and breaking devices controlling the operation of said actuator, means for automatically disengaging the phonograph-carriage from the feed-screw when the circuit closes, and means for automatically reengaging said arm and feed-screw when the circuit breaks.

3. The combination with a phonograph, of a phonograph-carriage-retracting device comprising a solenoid-actuator, means for energizing the solenoid, automatic circuit closing and breaking devices controlling the operations of the actuator, said closing devices consisting of the shifting rods, the extension-arm of the speaker-carrying arm actuating said rods at the end of the range of said arm, the incline on one of said shifting

rods, and the plunger of the mercury-contact device subject to said incline.

4. The combination with a phonograph, of a phonograph-carriage-retracting device comprising a solenoid-actuator, means for energizing the solenoid, automatic circuit closing and breaking devices controlling the operation of the actuator, and means for disengaging the phonograph-carriage from the feed-screw when the circuit closes, said means consisting of the crank-shaft carried on the phonograph-carriage arm, with the pin of said crank coupled to the solenoid-core, and the second crank of said shaft with its pin riding on the phonograph-slideway.

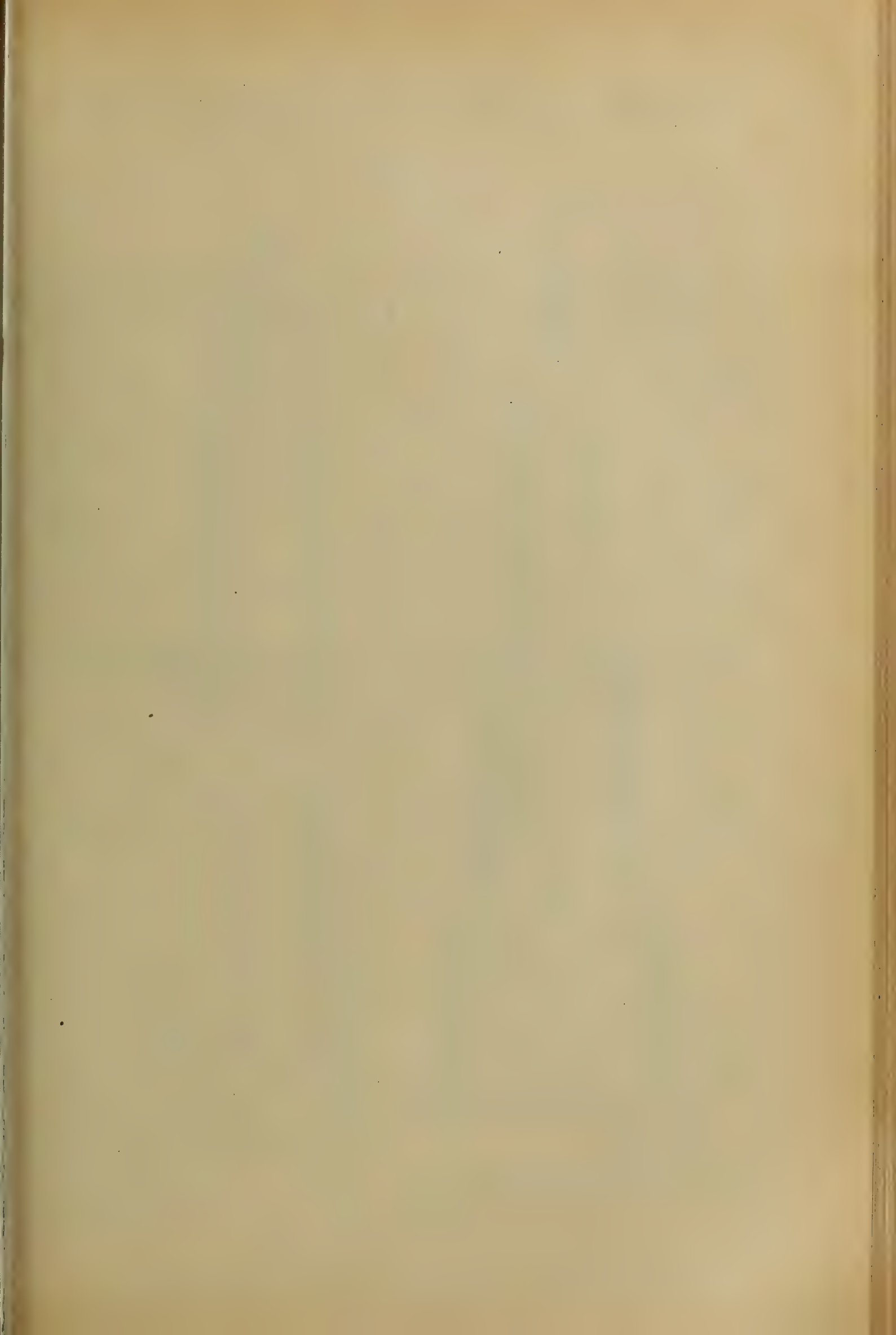
5. The combination with the phonograph, of a phonograph-carriage-retracting device comprising a solenoid-actuator, means for energizing the solenoid, automatic circuit closing and breaking devices controlling the operation of the actuator, means for disengaging the phonograph-carriage from the feed-screw when the circuit closes, and means for automatically reengaging said arm and feed-screw when the circuit breaks, said means consisting of the crank-shaft carried on the phonograph-carriage arm with the pin of said crank-shaft coupled to the solenoid-core, the second crank of said shaft riding on the phonograph-slideway and the gravitating arm of the phonograph-carriage carrying said crank-shaft.

Signed at New York this 29th day of March, 1905.

ARTHUR W. COLE.

Witnesses:

C. SEDGWICK,
J. M. HOWARD.



No. 829,836.

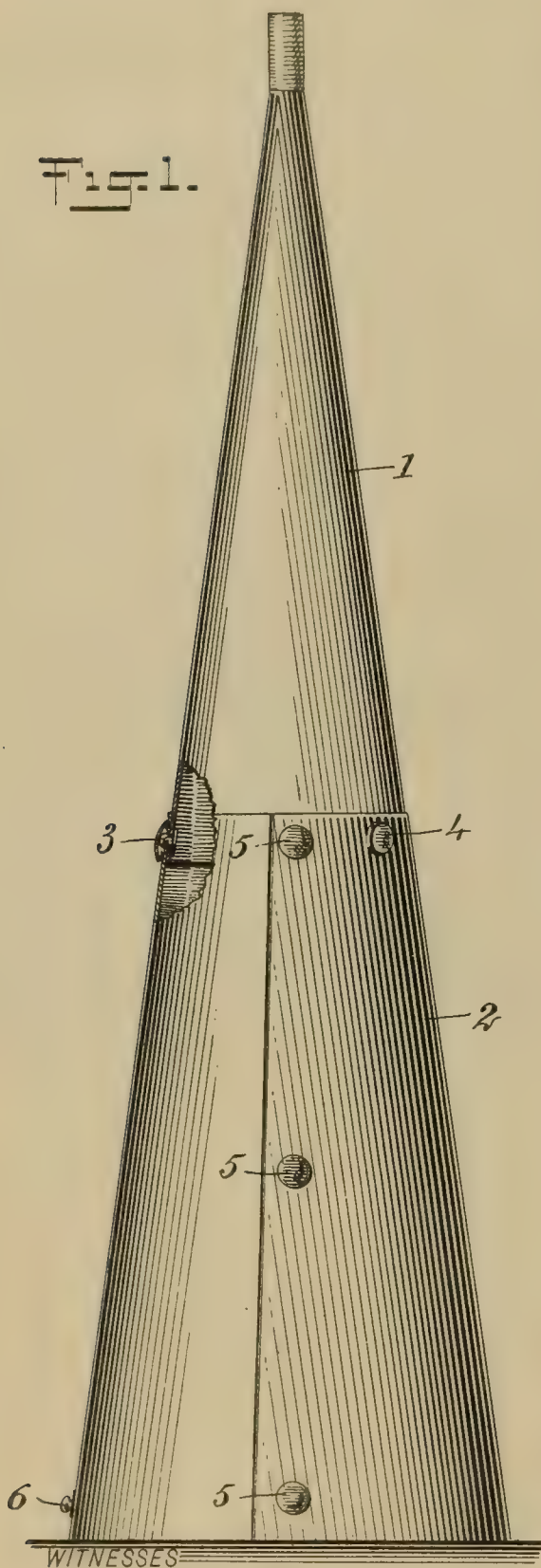
PATENTED AUG. 28, 1906.

C. R. BREEN.

HORN.

APPLICATION FILED APR. 5, 1906.

Fig. 1.



WITNESSES
Geo. W. Maylor
S. C. Kemon

Fig. 2.

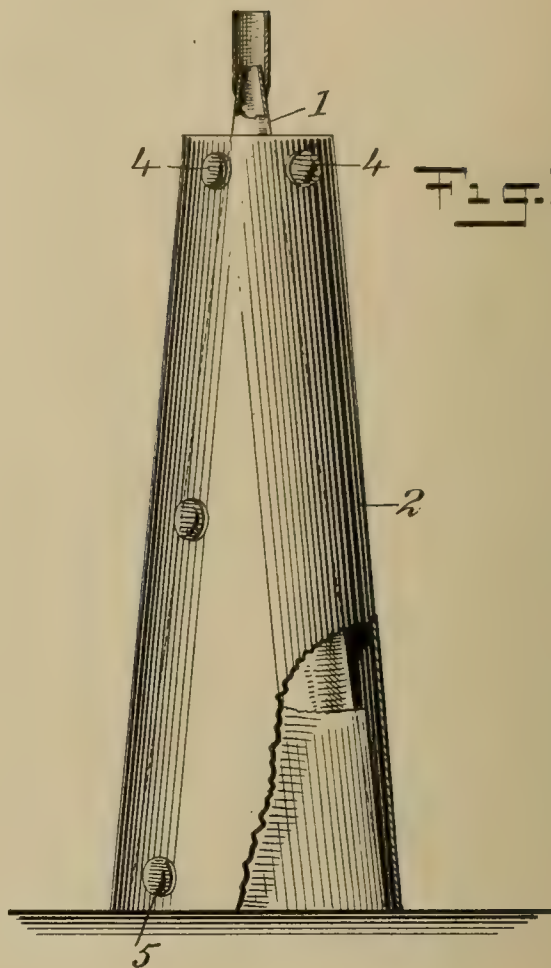
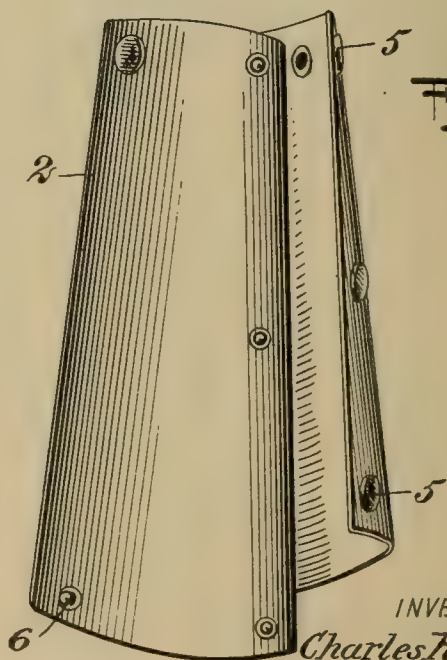


Fig. 3.



INVENTOR
Charles R. Breen
BY *Mum & Co*
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES R. BREEN, OF NEW YORK, N. Y.

HORN.

No. 829,836.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed April 5, 1906. Serial No. 310,017.

To all whom it may concern:

Be it known that I, CHARLES R. BREEN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Horn, of which the following is a full, clear, and exact description.

This invention is an improvement in horns, more especially designed to be used in connection with phonographs and other like machines, but may be used with advantage where a horn of this character is desired.

The main object of the invention is to produce a superior horn or trumpet to those hitherto devised for use in connection with phonographs or other talking-machines and one which is highly resonant, but devoid of the objectionable metallic sound so often encountered in devices with a like object in view.

Another object of the invention is to so construct the horn as to have a removable outer section which may be wrapped about the small end of the horn in order that the whole may be packed in a small compass.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly-sectional side elevation of one embodiment of my invention. Fig. 2 is a partly-sectional side view showing the removable section detached and wrapped about the small end of the horn, and Fig. 3 is a perspective view of the removable section.

The numeral 1 indicates a horn in the form of a conical tube of suitable length constructed wholly of fiber paper, to which is buttoned an extension 2 of the same taper and of the same material and of substantially the same length. At the large end of the horn 1 a series of balls 3 are circumferentially secured, passing on the outside of the horn and suitably spaced apart. The extension 2 is split longitudinally and is of such dimensions that when the edges are slightly lapped the small end will be a bit smaller in diameter than the large end of the part 1.

Circumferentially spaced about the small end of the extension 2 is secured a number of sockets 4, opening on the inside of the extension and equal in number and adapted to register with balls 3 at the end of the horn 1 and lock the extension in place when the

balls and sockets are pressed together. Where the edges of the extension lap they are secured together by a number of ball-and-socket fastenings 5 6, similar to those carried at its end and by the large end of the horn 1.

When the horn is to be used, the ball-and-socket fastenings 3 and 4 are engaged, as also those on the edges of the longitudinally-split extension 2, presenting the appearance when assembled as shown in Fig. 1.

When desired to pack the horn for the purpose of carrying it about, the ball-and-socket fastenings are disengaged and the extension wrapped about the horn 1, as shown in Fig. 2, with the lower socket 5 engaged with an auxiliary ball 6 near the outer end, but some distance in from the longitudinal split of the extension. The horn and extension can now be packed in a box of about one-half the size as it would require if they were made as an integral part. By making the horn and extension of paper fiber I am enabled to get a full, even, and continuous volume of sound in which the articulation will be non-metallic, but clear and distinct. In practice I have found it convenient to cover the horn and extension with linen or other fabric to give them a good appearance.

It is obvious that additional extensions may be fixed to each other in the same manner as the extension shown is fixed to the horn without departing from the spirit of my invention or sacrificing any of the advantages thereof.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A horn of the class described comprising an integral, conical tube of paper fiber, a series of ball-fastenings at the outer end thereof, an extension for the horn split longitudinally of its length having a series of sockets at its inner end adapted to register and engage the ball-fastenings on the horn, ball-and-socket fastenings for locking the longitudinal edges of the extension together, and an auxiliary ball on the extension for locking with a socket on its longitudinal edge when the extension is wrapped about the horn.

2. A horn of the class described comprising a conical tube, and a split extension adapted to be fastened to its end and unfastened, and wrapped to inclose the tube, for the purpose specified.

3. A horn of the class described comprising a conical tube of paper fiber, and a split extension of the same material adapted to be fastened to its end, and unfastened, and
5 wrapped to inclose the tube, for the purpose specified.

4. A horn of the class described comprising a conical tube, and a split extension adapted to be fastened thereto and wrapped there-
10 about, said horn and extension being of substantially equal lengths.

5. A horn of the class described comprising a conical tube, a split extension removably secured thereto by ball-and-socket fasten-
15 ings, and auxiliary fastening means for se-

curing the extension to substantially inclose the horn.

6. A horn of the class described, a conical tube of paper fiber, a split extension of the same material removably secured thereto by
20 ball-and-socket fastenings, and fastening means for securing the extension to substantially inclose the horn.

In testimony whereof I have signed my name to this specification in the presence of
25 two subscribing witnesses.

CHARLES R. BREEN.

Witnesses:

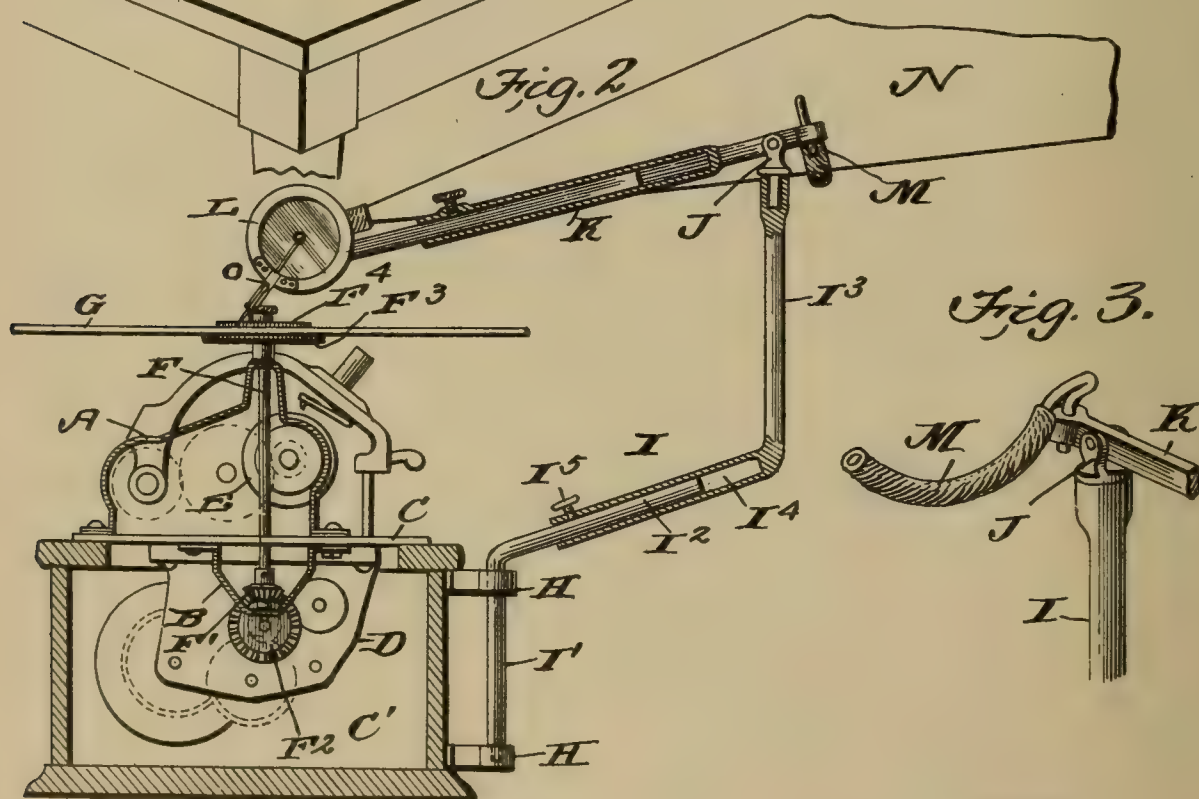
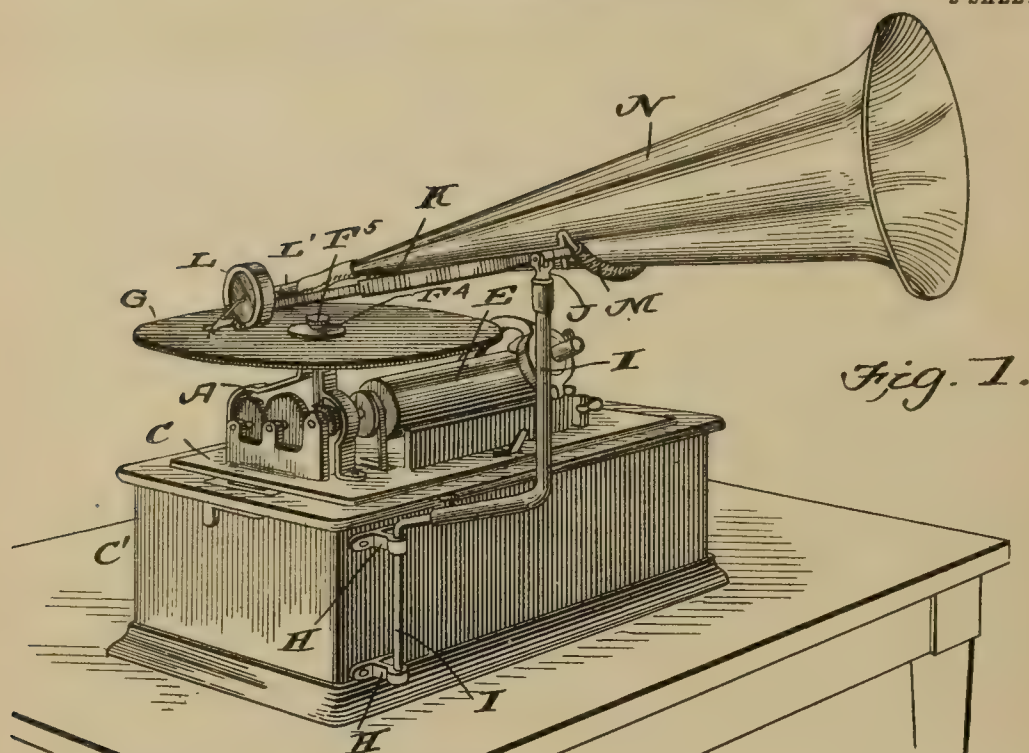
JOHN G. NAURATH,
JAC. B. ZEEGLER.

No. 829,848.

PATENTED AUG. 28, 1906.

J. V. CRUSO.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED APR. 10, 1905.

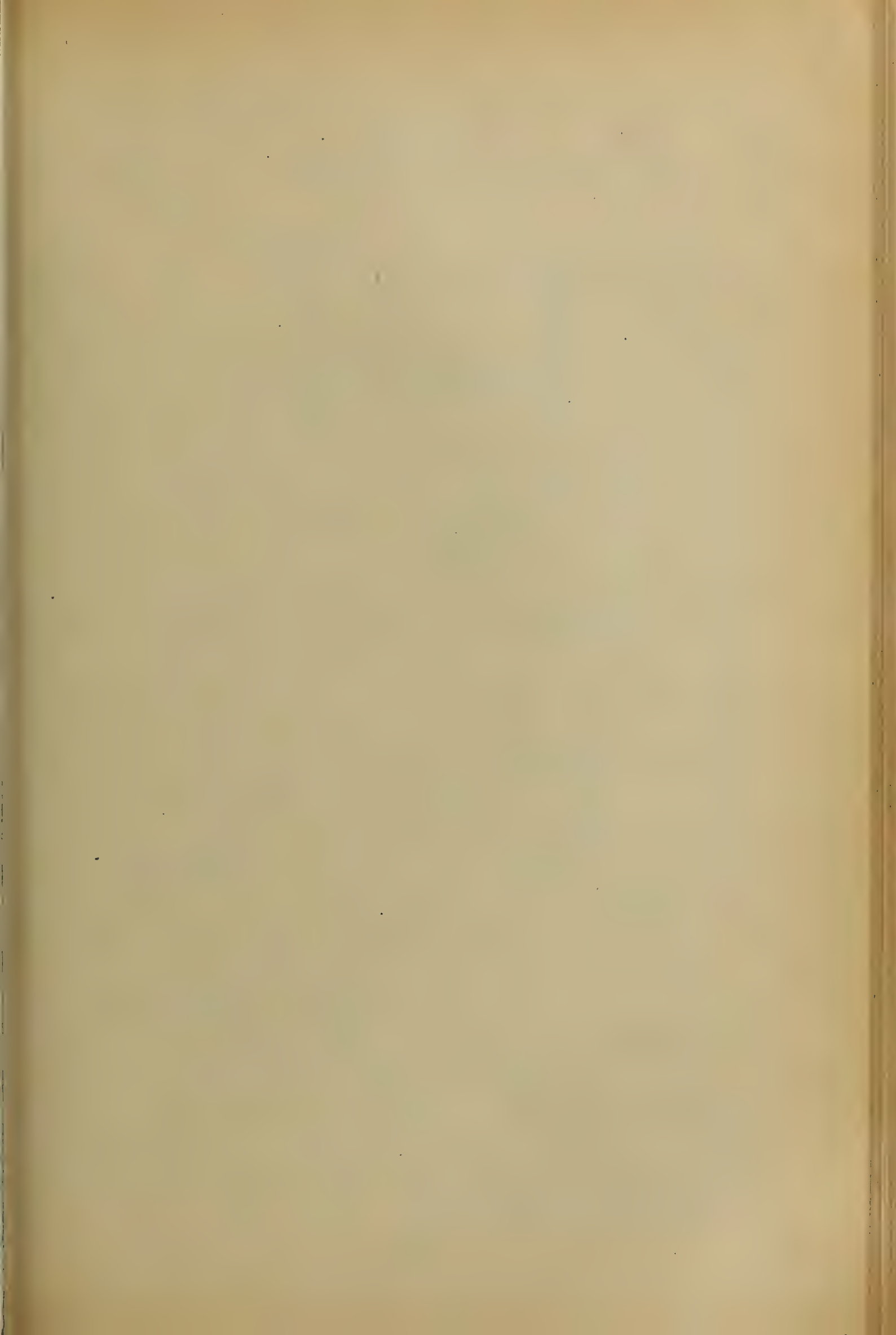
2 SHEETS—SHEET 1.



WITNESSES:

Ms. Blondel.
E. M. Venn.

INVENTOR
J. V. Cruso.
BY
O'Meara & Brock,
ATTORNEYS



J. V. CRUSO.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED APR. 10, 1905.

2 SHEETS—SHEET 2.

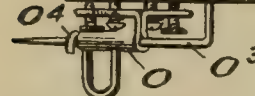
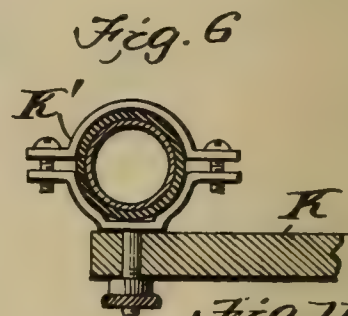
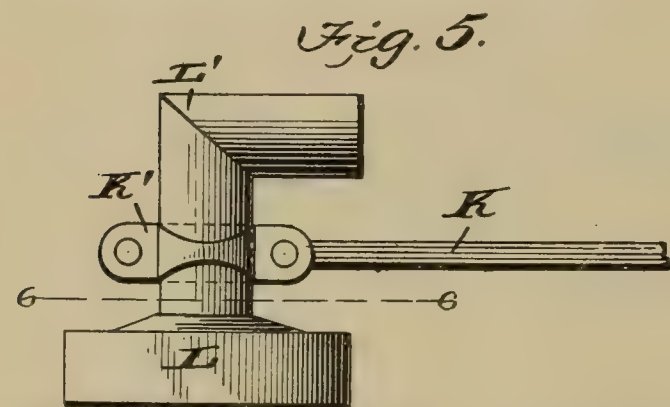
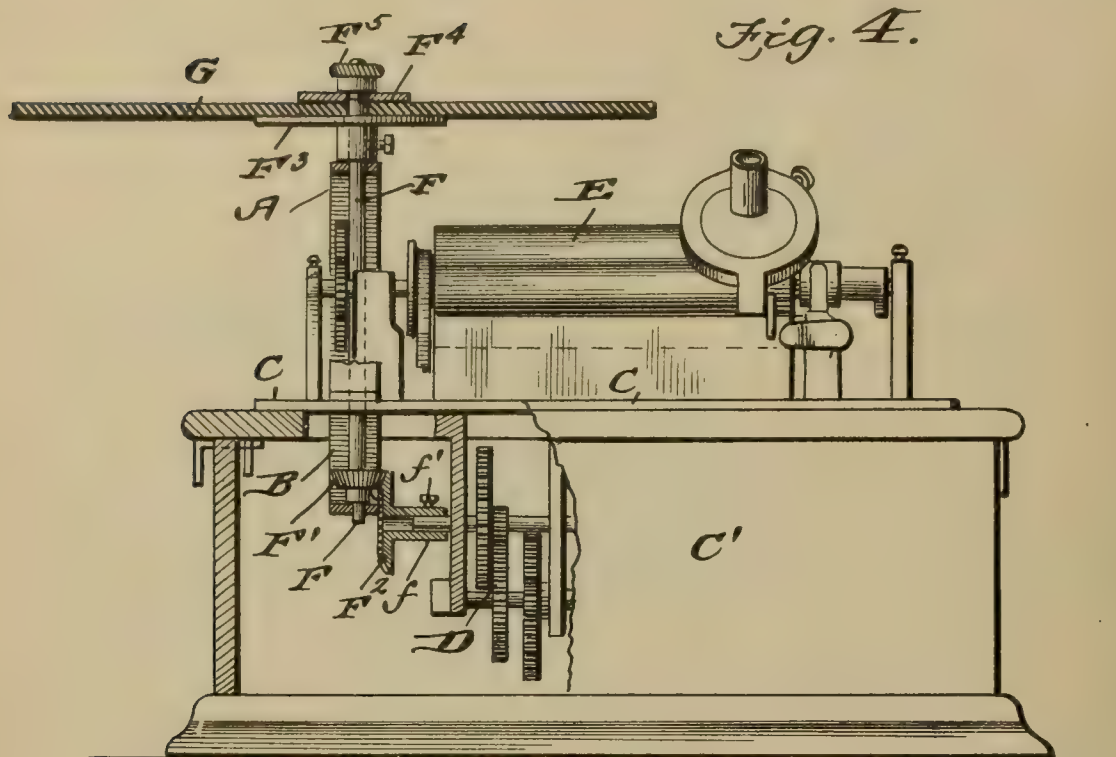


Fig. 7 Fig. 8

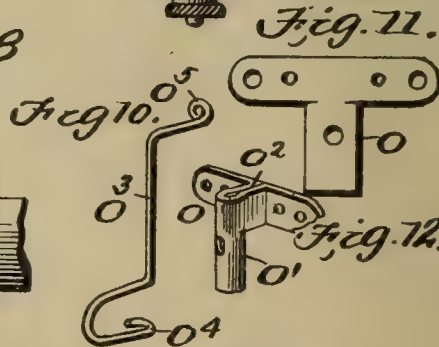
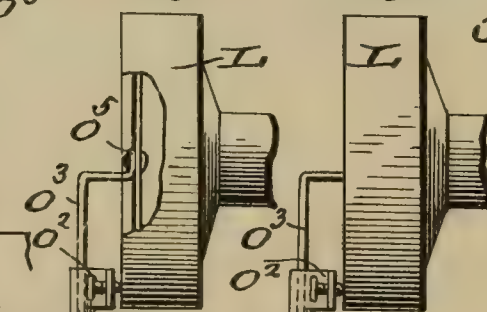


Fig. 9.



WITNESSES:
M. B. Blondel.
E. M. Venn.

INVENTOR
J. V. CRUSO.

BY
O'Meara & Shock,
ATTORNEYS

UNITED STATES PATENT OFFICE.

JAMES VINCENT CRUSO, OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-HALF TO THOMAS JOSEPH HINTON, OF NEWARK, NEW JERSEY.

PHONOGRAPH ATTACHMENT.

No. 829,848.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed April 10, 1905. Serial No. 254,863.

To all whom it may concern:

Be it known that I, JAMES VINCENT CRUSO, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Phonograph Attachments, of which the following is a specification.

This invention relates to an improved phonograph attachment, and has for its object to provide a device by which the ordinary cylinder-record-operating machines may be employed for operating a disk-record, and thus adapting the one machine to both forms of records.

The invention comprises certain and peculiar details of construction and novel arrangement of parts, as will be fully described in the following specification, and pointed out in the claim, reference being had to the drawings, in which—

Figure 1 is a perspective view illustrating my improvements applied to the ordinary cylinder-record machine. Fig. 2 is a sectional elevation of the same. Fig. 3 is a detail view showing the horn-supporting device. Fig. 4 is an enlarged sectional face view of a machine having my invention applied. Fig. 5 is a detail view illustrating the reproducer and the manner in which it is secured to the supporting-lever. Fig. 6 is a detail section of the same drawn on the line 6 6 of Fig. 5, and Fig. 7 and Fig. 8 are detail views of the reproducer, showing the form of stylus-holder I employ, and Figs. 9, 10, 11, and 12 are detail views of the stylus-holder, Fig. 11 being of the blank of which a portion of the holder is made.

In the drawings I have shown an ordinary cylinder-record machine of the Edison type; but I desire it understood that my attachment is equally adaptable to other makes and styles of cylinder-record machines.

Referring now to the drawings, it will be seen I employ two brackets A and B, which are suitably fixed to the upper and lower faces, respectively, of the base-plate C of the casing C' and to which is also connected the operating mechanism D and cylinder-record holder E and also the other parts which constitute the machine as a whole. In the brackets A and B is journaled a shaft F, carrying at its lower end a beveled pinion F', which meshes a beveled gear F², that is secured to one of the shafts of the motive

power D, and in order to provide for a ready attachment of the gear I make it with an elongated hub *f*, which fits over the projecting end of the shaft and carries a set-screw *f'* for tightly securing the gear in position. To the opposite or upper end of the shaft is connected a face-plate F³, upon which rests the record-disk G, and to securely hold the disk upon the face-plate I provide a suitable binding-plate F⁴ and nut F⁵, which operates upon the end of the shaft and engages the disk, as will be readily understood.

By the arrangement just described it will be readily seen that when the mechanism for operating the cylinder-record is set in motion movement will be imparted to the disk-record and the latter revolved. Of course for this arrangement means must be provided for supporting the reproducer which carries the stylus that engages the disk and also a suitable support for the horn, which is connected to the reproducer, and to that end I employ brackets H, which are secured to the side of the casing and in which is journaled the swinging arm I, having a swiveled head J, in which is pivotally held a lever K, carrying a clamp K' at its forward end for holding the reproducer L, and a swinging bracket-arm M at its opposite end, which forms a support for the horn N, and to accommodate various sizes and weights of horns, so that an even balance of the lever may be had to permit the stylus of the reproducer the proper pressure upon the disk, I construct the arm I in sections, the lower section comprising a vertical portion I' and an upper angle portion I², and the upper section of a vertical portion I³ and a lower tubular angle portion I⁴, which fits over the angle portion I² of the lower section and is securely held in place by a set-screw I⁵. By this arrangement it will be seen that should a large heavy horn be employed the sections may be adjusted so that the swivel-carrying end of the arm will be greater distance from the disk-shaft than if a lighter horn be used, and the bracket carried by the lever will engage the horn at such a point that the proper balance will be had. The arm K is also made in sections telescopically connected to accommodate the adjustments of the arm I and permit the reproducer to properly rest upon the record, the sections being held together by means of a set-screw, as shown.

The bracket M for supporting the horn is preferably constructed of a single piece of wire bent at one end to provide a vertical shank, which is designed to enter an opening in the outer end of the lever, and its opposite end bent to provide a semicircular portion, which forms the rest for the horn, and in practice I propose to cover the latter portion with rubber to avoid defacing the horn in any way. I also provide a special arrangement for holding the stylus to the reproducer, and to that end I employ a bracket O, which is constructed of a single piece of metal bent to provide a tubular member O', from which extend arms O², by which the bracket is secured to the reproducer. A spring-arm O³ is held in a portion of the tubular member of the bracket and has its outer end projecting through an opening therein, which end is bent to provide a spring-hook O⁴, which encircles the stylus when the latter is placed in the remaining tubular portion of the bracket, and through the tendency of the hooked end to spring out of alinement with the tubular portion of the bracket the stylus will be firmly clamped in position. The rear end of the spring-arm O³ is bent inwardly and has its extreme end bent into circular form, as shown at O⁵, through the opening of which is passed a screw or rivet, by which the arm is firmly held to the diaphragm of the reproducer. In practice I propose to make the reproducer with an elbow tubular section L', which affords ready attachment for the rubber tube carried by the horn.

From the foregoing it will be seen that I provide an exceedingly cheap, simple, and highly efficient device by which the ordi-

nary cylinder-operating mechanism may be utilized for operating a disk-record. It may be stated, however, that when my invention is in operation the cylinder for supporting the cylindrical records is operated, but of course the reproducer and stylus are held from contact therewith; but should it be desired to use both records simultaneously the regulating mechanism may be readily adjusted so that both records will be operated at the same speed; but of course when this is done a separate horn will be connected to the reproducer operating upon the cylindrical record.

It will thus be seen that I provide a very useful construction, and a further detail description of the operation of the machine is deemed unnecessary, as it will readily appear to those experienced in operating such machines; but it may be added, however, that either record may be operated independently and that the operation of either will not affect or impair the operation of the other.

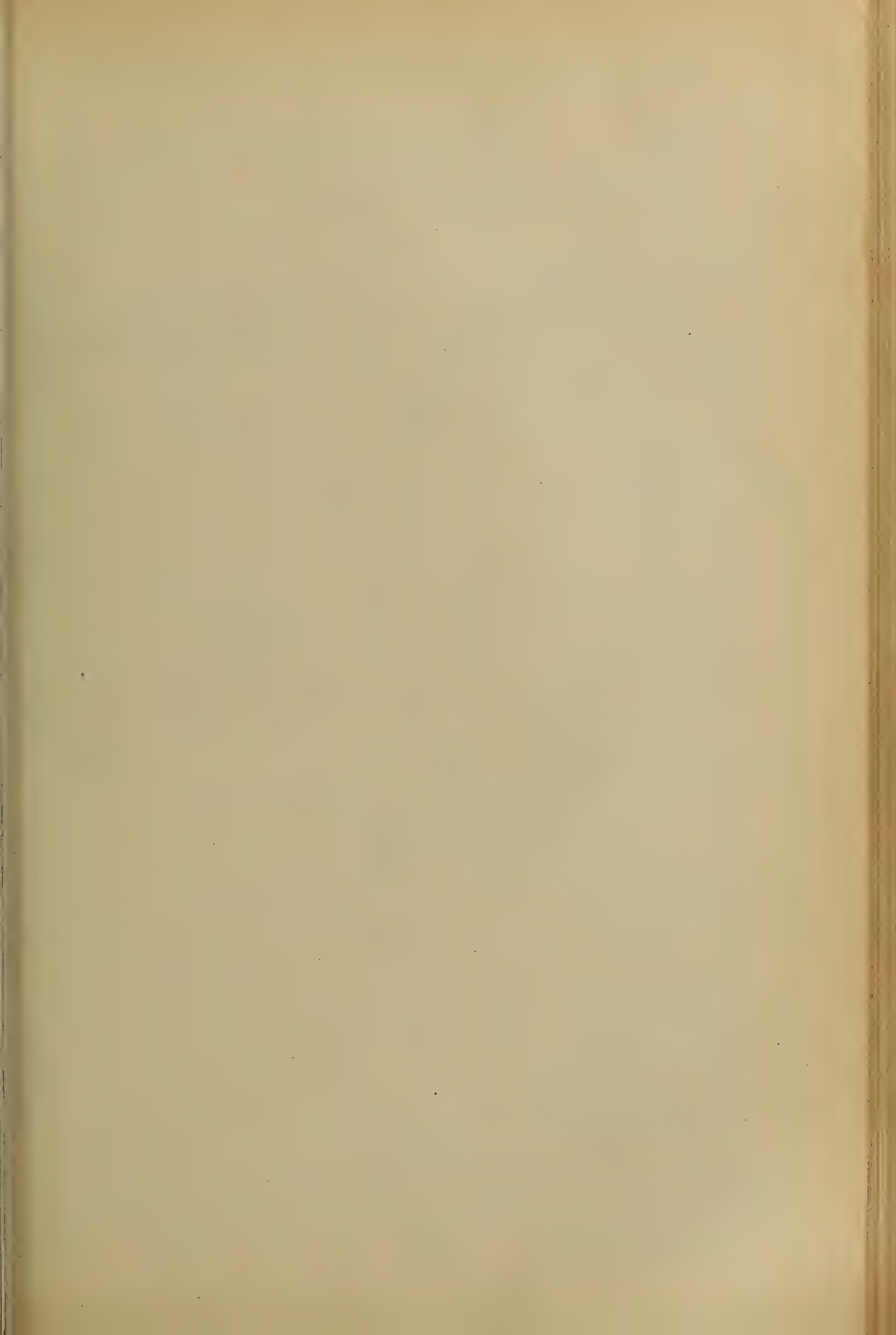
Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a phonograph, a base-plate, upper and lower brackets secured to opposite faces of the base-plate, a shaft extending through the base-plate and journaled in the brackets, means for rotating the shaft, and a disk-holding plate carried by the shaft above the upper bracket.

JAMES VINCENT CRUSO.

Witnesses:

THOMAS JOSEPH HINTON,
M. D. BLONDEL.



No. 830,446.

PATENTED SEPT. 4, 1906.

T. H. MACDONALD.
SOUND REPRODUCER.
APPLICATION FILED JAN. 19, 1904.

FIG. 1.

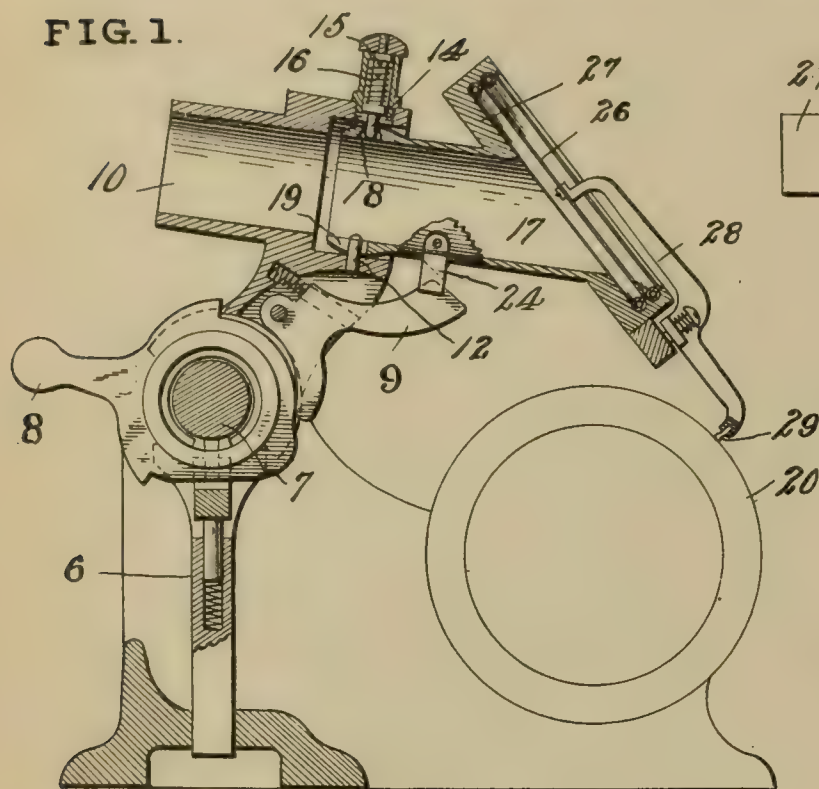


FIG. 6.

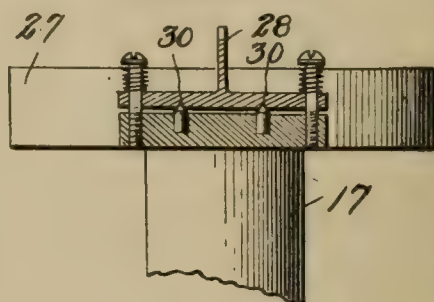


FIG. 4.

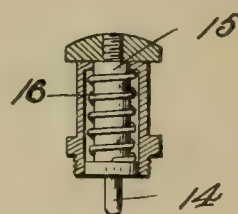


FIG. 2.

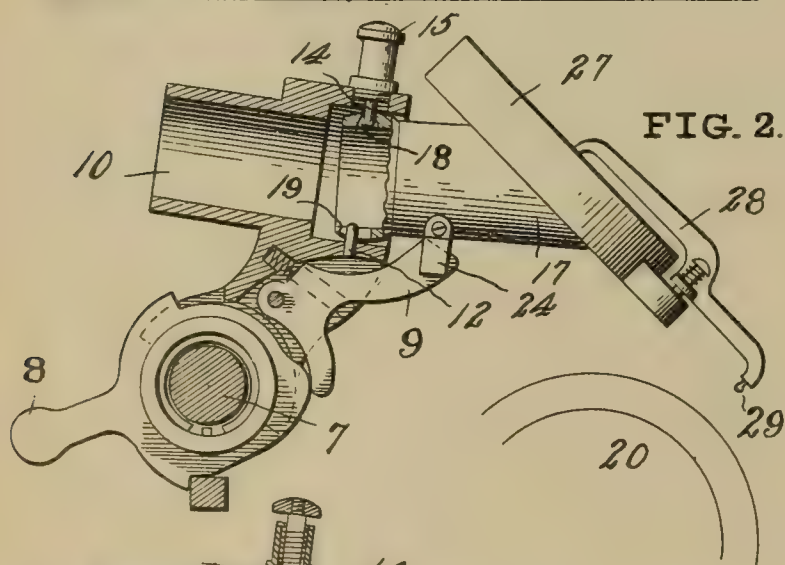


FIG. 5.

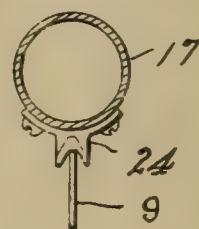
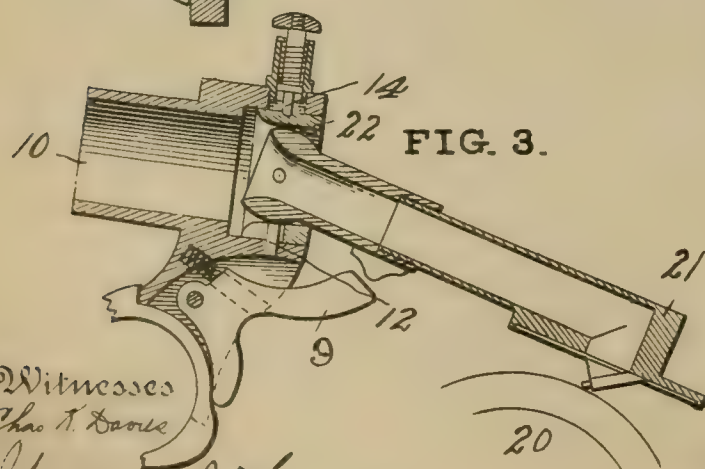


FIG. 3.



Witnesses
Chas. T. Davis

Gustave R. Thompson

Inventor
Thomas H. Macdonald,
by Skene, Cameron, Lewis & Massey
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT.

SOUND-REPRODUCER.

No. 830,446.

Specification of Letters Patent.

Patented Sept. 4, 1906.

Application filed January 19, 1904. Serial No. 189,696.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Sound-Reproducer, which invention is fully set forth in the following specification.

This invention relates more particularly to the reproducer of a graphophone, and has for one of its objects the adaptation of what are called "pivot-point" reproducers for use with records of varying depth.

Illustrations of pivot-point reproducers are given in my prior applications for patent, Serial No. 153,143, filed April 17, 1903, and Serial No. 187,295, filed December 31, 1903.

The improvements constituting the present invention can best be explained in connection with the accompanying drawings, wherein—

Figure 1 is a cross-section of a graphophone, showing the reproducer in operative position. Fig. 2 is a similar view of the carriage and reproducer, the latter being raised out of contact with the record. Fig. 3 is a similar view showing the recorder in place. Fig. 4 is a detail of the spring-plunger. Fig. 5 is a detail in cross-section of the sound-conveying chamber of the reproducer, and Fig. 6 is an enlarged detail of part of the reproducer.

The carriage 6, feed-screw 7, lifting-lever 8, and lifter 9 are of ordinary or suitable construction. The carriage has, as usual, a socket 10 to receive the recorder or reproducer. This socket contains at the bottom a fixed pin 12 and diametrically opposite thereto a movable pin 14, carried by a plunger 15, which is normally pressed downward by a spiral spring 16. The tubular chamber 17 of the reproducer has on its upper side a hole or depression 18, which tapers upwardly, and at its lower side a slot 19, which extends to the end of the chamber.

When the reproducer is in operative position, as shown in Fig. 1, it is free to oscillate laterally on an axis coincident with the pins 12 14. It is also free to move up and down to accommodate itself to irregularities in the surface of the record 20, which in this case is shown as cylindrical in form. This motion is permitted by the flaring shape of the hole 18 and by the curved surface of the end of the tubular chamber 17 which enters the socket. To remove the reproducer, plunger 15 is lifted, permitting its withdrawal.

The recorder 21, Fig. 3, is pivoted at its

ends within a ring 22, which fits tightly in the socket 10 and is also provided with holes to receive the pins 12 14. The recorder may thus oscillate on a horizontal axis, but not on a vertical axis.

Beneath the tubular chamber 17 of the reproducer is a slotted piece or saddle 24, in which the lifter 9 engages to raise the reproducer from the record, as shown in Fig. 2. The slot in saddle 24 guides the lifter to the center line of the reproducer.

Heretofore the diaphragm 26 of the reproducer has been placed in a plane transverse to the axis of the conveying-tube 17 of the reproducer or in a plane parallel therewith. According to this invention the diaphragm 26 and sound-chamber 27 are in a plane oblique to the tube 17, which gives superior acoustical results. The stylus-carrying arm or lever 28 is attached to the diaphragm at one end and carries the stylus 29 at the other. Owing to the oblique arrangement of the diaphragm and the relative positions of the other parts, the stylus acts upon the record in a line approximately perpendicular to the tangent at the point of contact and perpendicular to the plane of the diaphragm. The stylus arm or lever 28 is fulcrumed on pivot-points 30, Fig. 6, as described in my aforesaid applications; but the improvements herein set forth are not limited to pivot-point reproducers, though in some respects particularly applicable thereto.

I claim—

1. The combination with the carriage having a tubular socket, of a fixed pin and a movable pin therein, a spring-plunger carrying the movable pin, and a reproducer having a sound-conveying tube provided with a slot and a flaring hole for engagement with said pins.

2. The combination with the carriage having a tubular socket, of a fixed pin and a movable pin therein, a spring-plunger carrying the movable pin, and a recorder pivoted in a ring which fits closely in said socket, said ring having holes for engagement by said pins.

3. The combination with the socket having a fixed pin and a movable pin, of a reproducer supported when in place in said socket and having freedom of motion in two directions, a slotted saddle beneath the reproducer, a lifter engaging in the slot of said saddle, and operating means for the lifter.

4. The combination of a sound-record with a sound-reproducer having a casing, a sound-

conveying tube or chamber, a diaphragm disposed obliquely to the tube or chamber, a stylus-lever fulcrumed between its ends on said casing and having one arm engaging the
5 diaphragm, and a stylus on the other arm vibrating perpendicular to the record.

5. The combination of a sound-record with a sound-reproducer having a casing, a sound-conveying tube or chamber, a diaphragm disposed obliquely to the tube or chamber, a
10 stylus-lever pivoted between its ends on said

casing and having one arm engaging the diaphragm, and a stylus on the other arm vibrating perpendicular to the record.

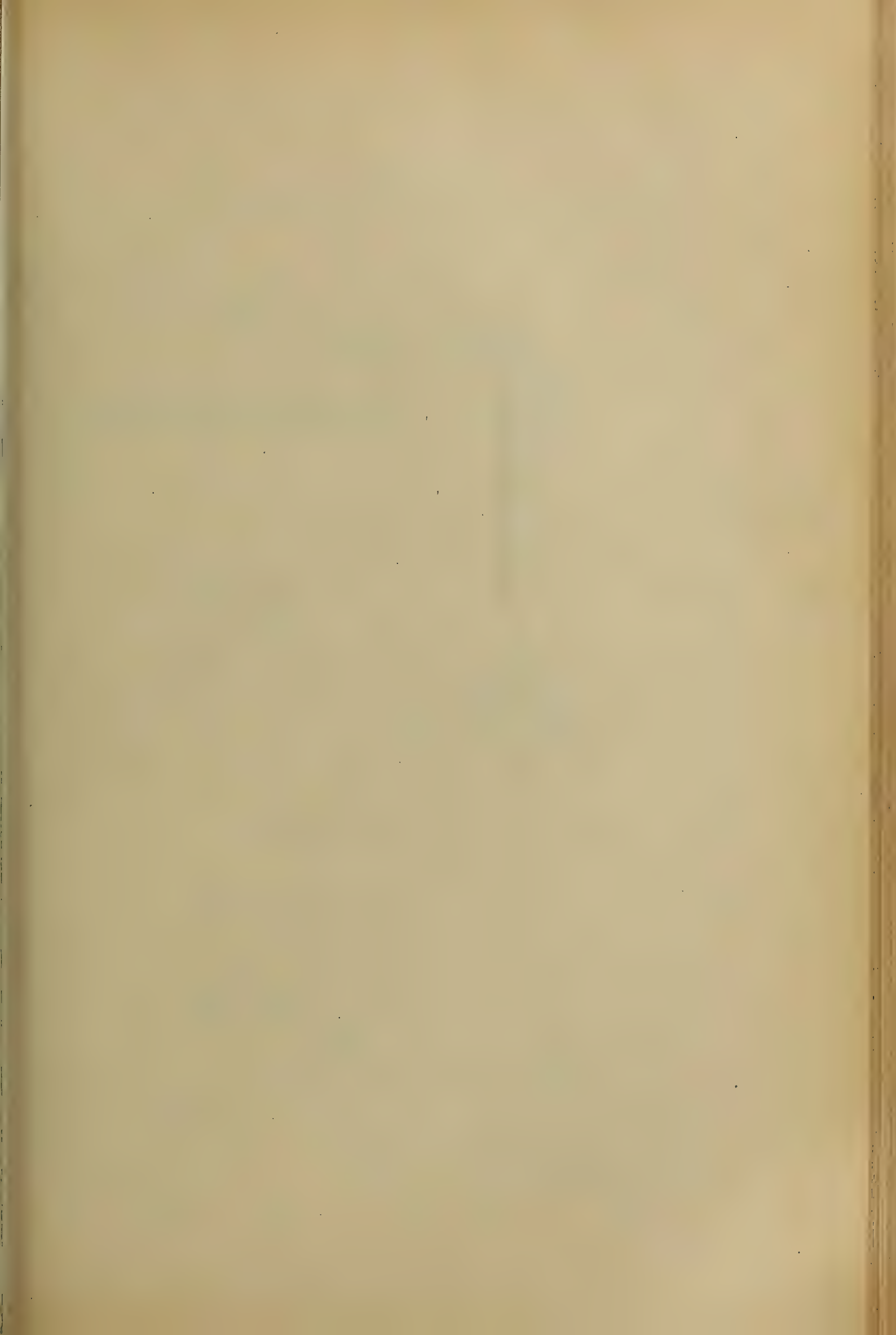
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

C. A. GIBNER,

A. B. KEOUGH.



No. 830,689.

PATENTED SEPT. 11, 1906.

L. P. VALIQUET.

SAFETY DEVICE FOR SOUND BOXES FOR TALKING MACHINES.

APPLICATION FILED MAY 3, 1904.

2 SHEETS—SHEET 1.

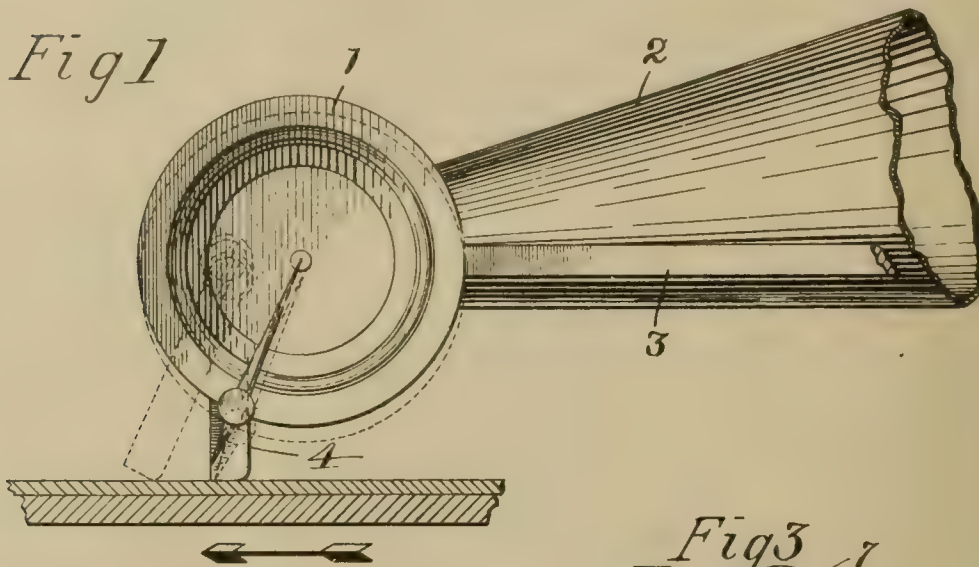


Fig 2.

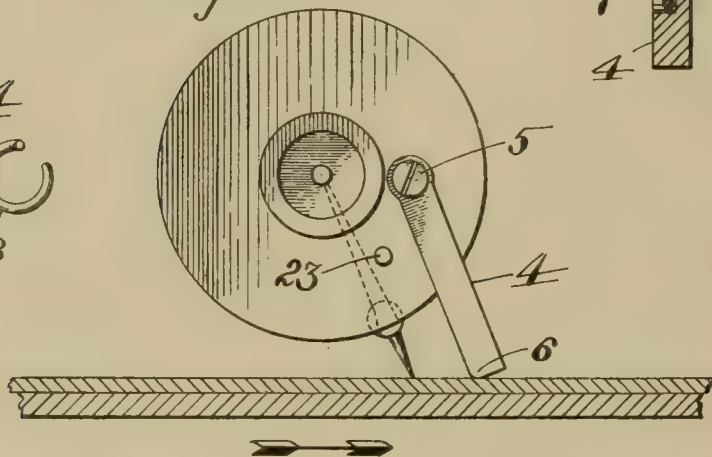


Fig 4

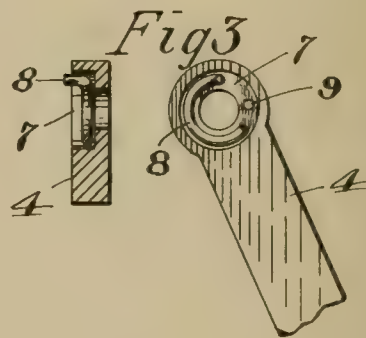
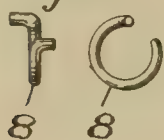
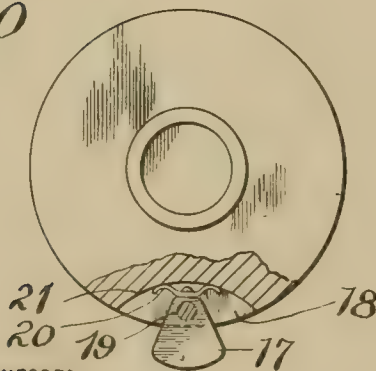


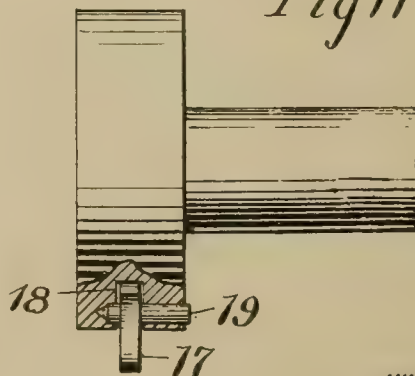
Fig 10



WITNESSES:

Philip Bellows.
Edw. W. Vaillgr

Fig 11



INVENTOR
Louis P. Valiquet
BY
Homer Bellows
ATTORNEY.

No. 830,689.

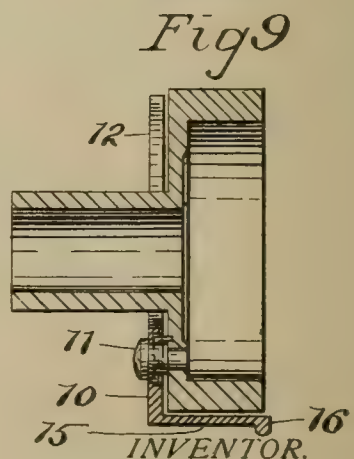
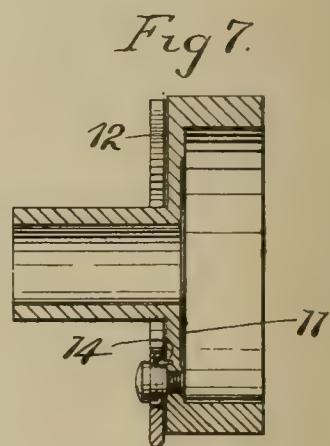
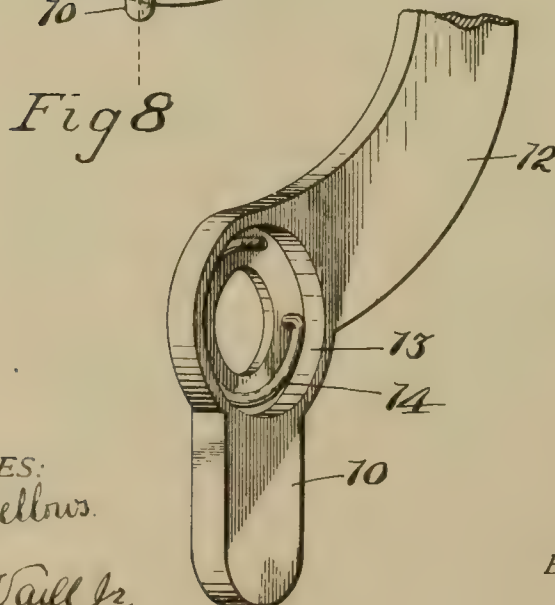
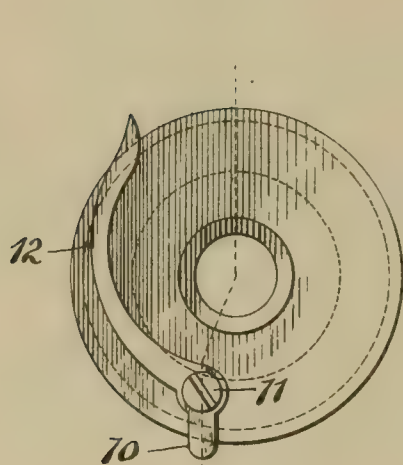
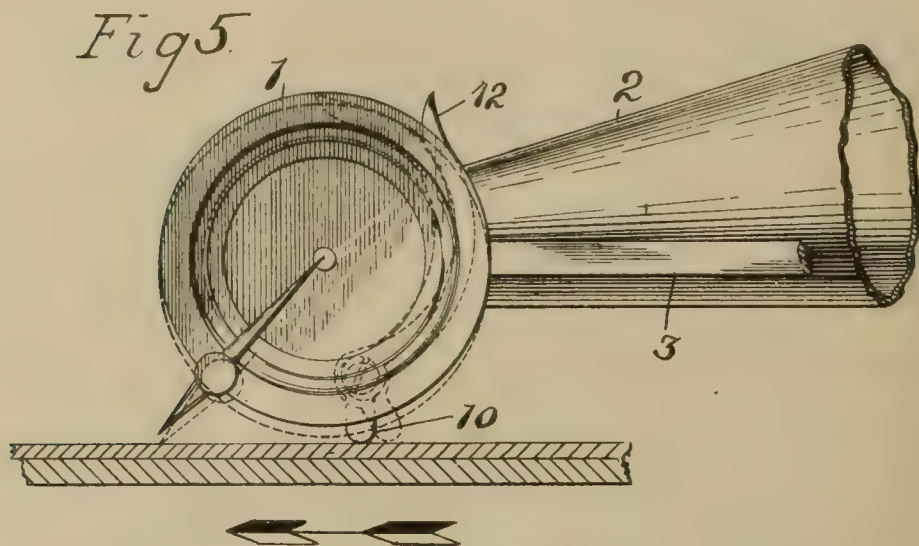
PATENTED SEPT. 11, 1906.

L. P. VALIQUET.

SAFETY DEVICE FOR SOUND BOXES FOR TALKING MACHINES.

APPLICATION FILED MAY 3, 1904.

2 SHEETS—SHEET 2.



WITNESSES:
Philip Bellows.
Edw. W. Vaill Jr.

INVENTOR.
Louis P. Valiquet
BY *Wm. Bellows*
ATTORNEY.

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SAFETY DEVICE FOR SOUND-BOXES FOR TALKING-MACHINES.

No. 830,689.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed May 3, 1904. Serial No. 206,117.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States, and a resident of the city of New York, State of New York, have invented certain new and useful Improvements in Safety Devices for Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide a device in connection with sound-boxes for talking-machines such that the stylus of the sound-box will not rest in contact with the record or the turn-table when the machine is not in use and which will also prevent the needle, stylus-bar, and diaphragm from becoming injured should the sound-box and amplifying horn or tube be dropped or otherwise receive rough handling.

A further object of this device is to prevent the records from being injured by the needle or stylus if the sound-box should be suddenly dragged across the record-disk transversely to the record-grooves.

Briefly my invention comprises an attachment for a sound-box which is preferably pivoted thereto, but which may be manually operated or may be made automatically operative and inoperative by removing the sound-box and needle from said disk and by the movement of the record-disk.

For a full, clear, and exact description of different forms of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is an elevation of a sound-box and a portion of the amplifying-horn and showing the record in section. Fig. 2 is a rear elevation of the same sound-box shown in Fig. 1. Figs. 3 and 4 are detailed views of the means for retaining the safety device in its operative position. Fig. 5 is a front elevation of a sound-box embodying another form of my invention; Fig. 6, a rear elevation thereof; Fig. 7, a transverse sectional view; Fig. 8, a view of the safety device detached from the sound-box; Fig. 9, a view showing a modified form of the safety device or guard, and Figs. 10 and 11 views showing another form of safety device.

Referring to the drawings, the numeral 1 indicates a sound-box of any preferred construction having the usual amplifying-horn attached thereto, said sound-box being sup-

ported by the usual pivoted arm 3. However, I do not wish to be limited in the application of the different forms of my invention to this type of reproducing mechanism, as the same is applicable to any form of reproducing mechanism, including that known as the "hol-low-arm" type, as well as to the pivoted-arm type, above referred to, in which the amplifying-horn is supported on the arm itself. Attached to a portion of the sound-box, preferably the rear annular portion thereof, I provide an arm 4, which is pivoted to the sound-box casing by a screw 5 or by any other suitable device of the same nature. The lower end of the arm 4 is preferably slightly rounded, as indicated at 6, so that said end may rock upon the record-disk without injuring the same. As means for keeping the arm 4 in its operative position I counterbore the upper end of the arm 4, as indicated at 7, and place inside said counterbored section a circular spring 8, the ends of which are turned at right angles and one end of which is adapted to engage a hole or recess 9 in the arm 4, the other end being turned at right angles and engaging a similar recess in the casing of the sound-box. The size and tension of this spring 8 is such that when the stylus is not in contact with the record-disk the arm will assume a substantially vertical position and will therefore form a post or support for the sound-box; but when the record is rotated by the motor to reproduce the sound the lower end of said arm will be carried to one side until the point of the stylus comes in contact with the record. The arm 4 will therefore rest upon the record and drag over the surface of the same with a light pressure without in any way injuring or interfering with the action of the sound-box or record. A stop 23 may be provided to limit the movement of the arm 4 in one direction. It will thus be seen that I have provided a simple and efficient safety or protecting device for the stylus-bar of sound-boxes which will always be in position to protect said stylus when the sounds are not being reproduced from the record; but when said record and the sound-box are operative the safety device will be automatically thrown out of action.

In Figs. 5 to 9, inclusive, I have shown a modified form of my safety device which is adapted to be operated by the fingers of the person using the talking-machine. The nu-

meral 10 indicates a vertical arm which is pivoted to the sound-box casing at 11. The upper end of the arm 10 carries an extension or curved portion 12, which is adjacent to the rear side of the sound-box casing, but projects therefrom at its upper end so as to be easily engaged by the finger when the sound-box is being grasped to move it from one place to another. The arm 10 also has a countersunk portion, (indicated at 13,) which contains a circular spring 14, which is similar in shape to the spring 8 and has one bent end entering a recess 15, the other end being adapted to enter a corresponding recess 16 in the sound-box casing 1. By providing the upward extension 12 the arm 10 may be inclined so that the same will not contact with the record when the sound-box is in use; but the spring 14 is of sufficient strength to move the arm 10 and the upward extension thereof 12 into its normal position when the sound-box is not operating in connection with the record. In Fig. 9 I have shown the lower end of the arm 10 bent at right angles, as indicated at 15, said right-angle portion having a downwardly-projecting extension 16, which serves the same purpose as the arm 10 in the form last above described, with the exception that the projection 16 is brought nearer the stylus-bar at the front of the sound-box.

In Figs. 10 and 11 I have shown another modification, which is similar in action to that described in Figs. 1 to 4, inclusive, with the exception that the arm or guard is made in the shape of a sector 17, which is pivoted in a recess 18 by means of a pin or similar device 19. A bow-spring 20 is attached to the inner end of the sector 17 and bears upon the upper arc-shaped surface 21 of the recess 18. The spring 20 tends to hold the guard or support 17 normally extended from the central portion of the recess 18; but when the same is in contact with the record and the record is caused to revolve the support 17 will be thrown to one side, owing to the frictional contact with the record, and will allow the stylus to engage the record-groove. In this form of the device the record may be moved in either direction in relation to the sound-box and the effect will be the same, although, if deemed advisable, a stop may be employed to prevent the support or guard 17 from turning except in one direction.

The action of and the result attained by different forms of my invention as above described are similar, and the essential features thereof may be arranged in other ways and varied in shape and form without departing from the spirit and scope of my invention; but

What I claim, and desire to protect by Letters Patent of the United States, is—

1. The combination in a talking-machine,

of a sound-box provided with a stylus, a record and means mounted upon said sound-box for preventing the stylus from coming into violent contact with the record.

2. The combination in a talking-machine of a stylus, a record, means for revolving the record and means mounted upon said sound-box for preventing contact of the stylus with the record until the record is revolved.

3. A machine of the character described, having in combination a sound-box movable toward and from the record, and provided with a stylus, and shiftable means operative to engage the record for holding the stylus out of operative engagement therewith, said means when shifted permitting the stylus to engage said record.

4. The combination with a sound-box for talking-machines, of a pivoted guard or support adjacent the stylus-bar, means for keeping said guard in its normal operative position, and manually-operated means for putting said guard in inoperative position.

5. The combination with a sound-box for talking-machines, of a guard or support pivoted to the sound-box casing adjacent the stylus-bar, means for keeping said guard in its normally operative position and manually-operated means for putting said guard in inoperative position.

6. The combination with a sound-box for talking-machines, of a guard or support pivoted to the sound-box casing adjacent the stylus-bar, means for maintaining the same in a normal operative position, and manually-operated means for putting said guard in inoperative position.

7. The combination with a sound-box for talking-machines, of a guard or support pivoted to the sound-box casing, a spring for maintaining the same in a substantially vertical position, and manually-operated means for putting said guard in inoperative position.

8. The combination with a sound-box for talking-machines, of a guard or support pivoted to the sound-box casing, and having a rounded lower end, a spring for maintaining said guard in a substantially vertical position, and a finger-piece for putting said guard in a substantially oblique position.

9. The combination with a sound-box for talking-machines, of an arm pivoted at its upper end to the sound-box casing, and having a rounded lower end, means for maintaining said arm in a substantially vertical operative position, and a finger-piece for putting said guard in a substantially oblique position.

10. The combination with a sound-box for talking-machines, of a pivoted arm having a recess at its upper end, a circular or coiled spring in said recess, and connected with said casing and said arm for maintaining the latter in a substantially vertical operative position.

11. The combination with a sound-box for

talking-machines, of a pivoted arm having a counterbored portion surrounding the pivot, and a spring located in said counterbored portion for maintaining said arm in a substantially vertical operative position.

12. The combination with a sound-box for talking-machines, of a pivoted guard, said guard having a finger-piece to be engaged by the fingers to move the guard into its operative or inoperative position.

13. The combination with a sound-box for talking-machines, of a guard pivoted thereto, said guard having a finger-piece adapted to be engaged by the fingers for operating the same.

14. The combination with a sound-box for talking-machines, of a guard pivoted to the casing thereof, means for maintaining said guard in its normal operative position, and an extension for allowing said guard to be moved into its inoperative position.

15. The combination with a sound-box for talking-machines, of a guard pivoted to the casing thereof, and adapted to contact with the record to support the sound-box, means for maintaining said guard in its operative

position, and an extension connected with said guard for moving the same into its inoperative position.

16. The combination with a sound-box for talking-machines, of a guard pivoted to the rear portion of the casing thereof, said guard having a lateral extension, and a downward extension adjacent the front portion of the sound-box, means for maintaining said guard in its normal operative position, said guard having an upward extension by which the lower portion thereof is adapted to be moved into its inoperative position.

17. The combination in a talking-machine of a record and a sound-box, having means adapted to contact with the record, said means being held out of contact therewith when the record is at rest, the movement of the record serving to bring the said means into operative contact with the record.

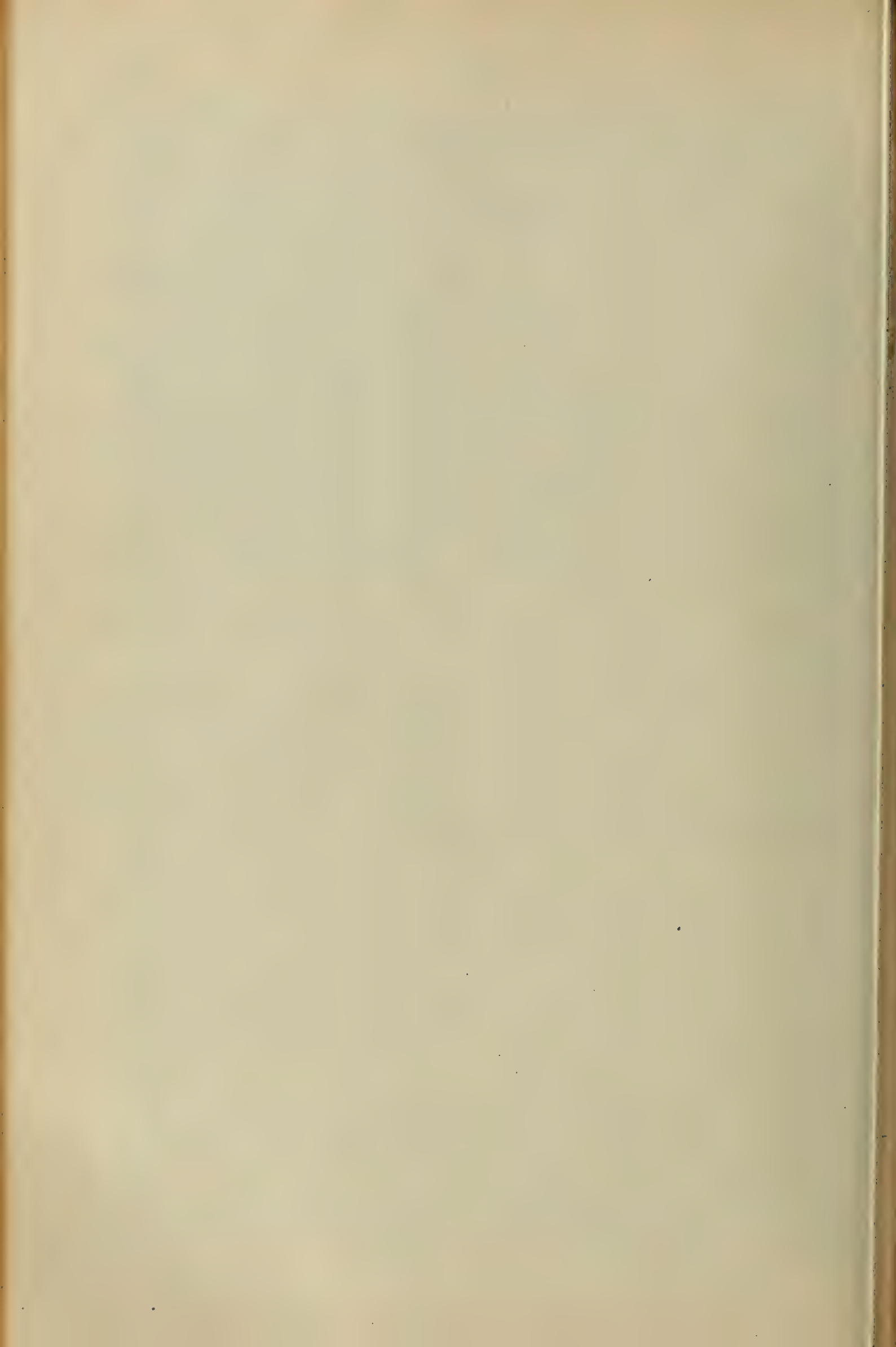
In witness whereof I have hereunto set my hand this 30th day of April, 1904.

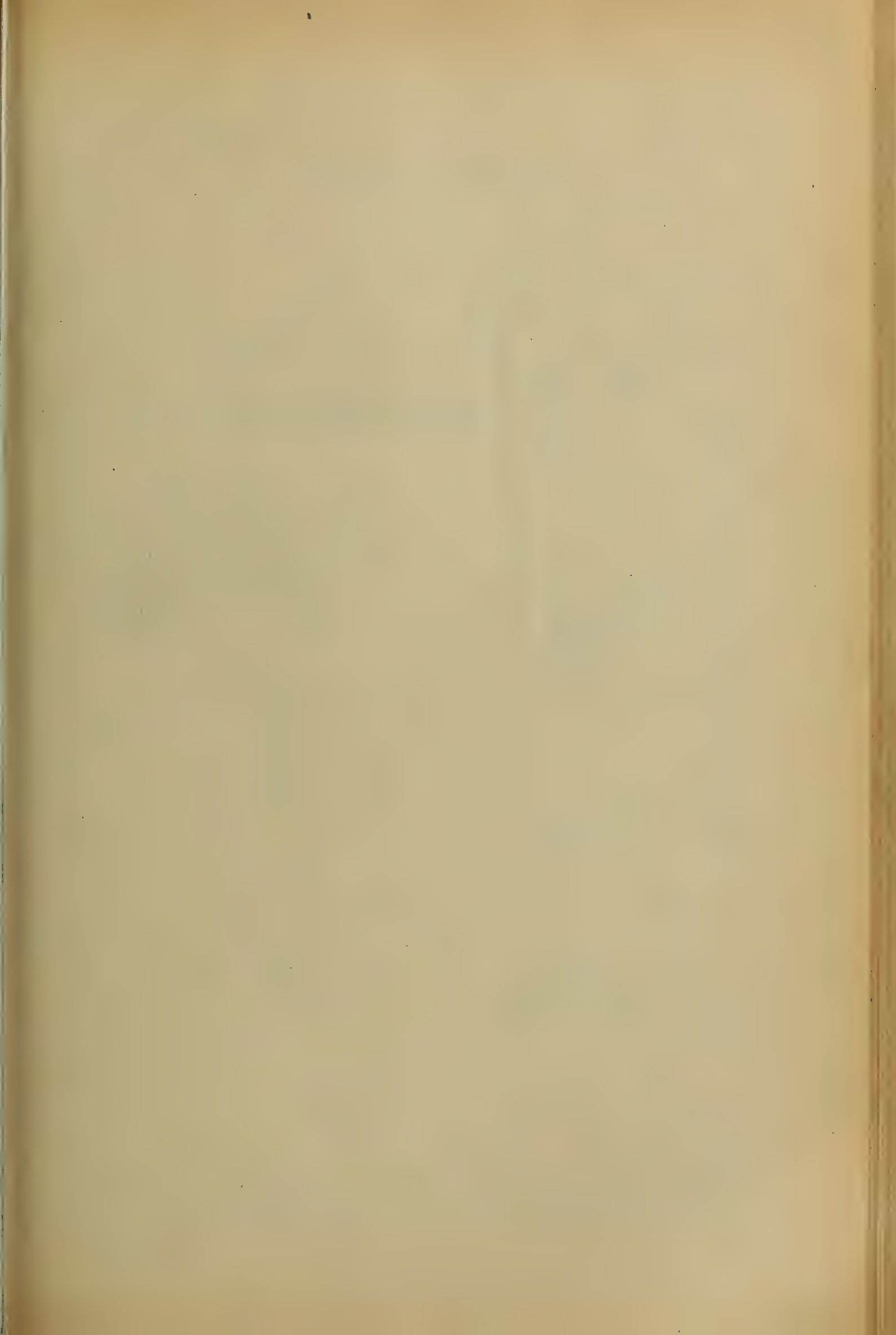
LOUIS P. VALIQUET.

Witnesses:

ADOLF SCHMINCKE,

FRANK C. SWARTWOUT.

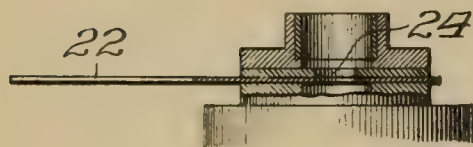
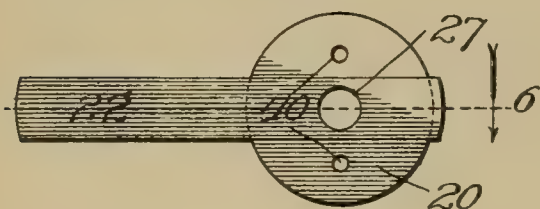
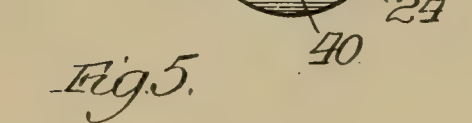
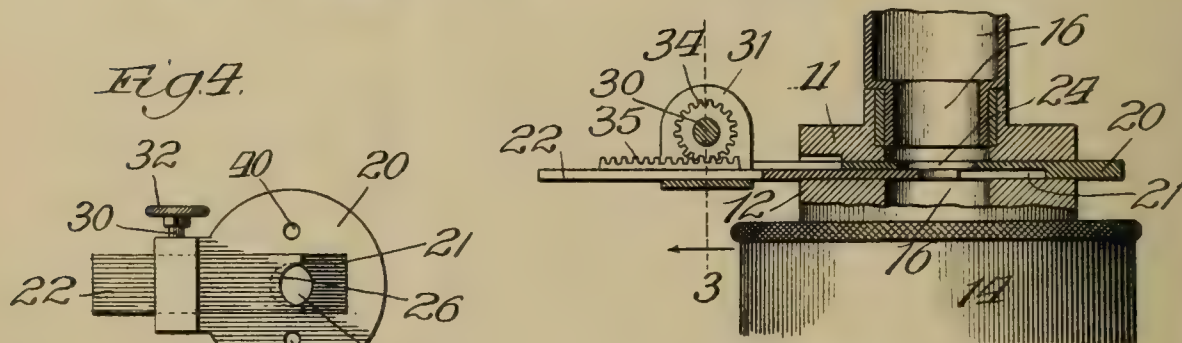
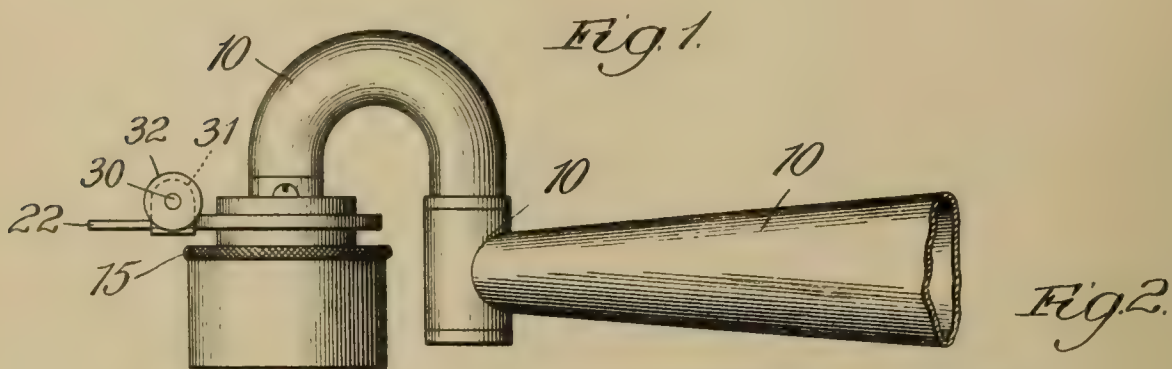




No. 831,188.

PATENTED SEPT. 18, 1906.

E. M. ROBINSON.
PHONOGRAPH TONE REGULATOR.
APPLICATION FILED DEC. 30, 1905.



Witnesses:
E. Gaylord.
John Enders.

Inventor:
Eugene M. Robinson
By Cheever & Cox,
Attorneys

UNITED STATES PATENT OFFICE

EUGENE M. ROBINSON, OF CHICAGO, ILLINOIS.

PHONOGRAPH TONE-REGULATOR.

No. 831,188.

Specification of Letters Patent.

Patented Sept. 18, 1906.

Application filed December 30, 1905. Serial No. 293,985.

To all whom it may concern:

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Phonograph Tone-Regulators, of which the following is a specification.

My invention relates to phonographs, and particularly to means for reducing the volume of sound-waves passing through the horn of the phonograph whereby a phonograph designed for outdoor work or for a large auditorium may be used in a small room without discomfort to the audience.

My invention is in some respects an improvement upon the device of my prior patent No. 778,271, for phonograph issued to me December 27, 1904, and as to its principal features is a division of my application for patent on phonograph, Serial No. 251,470, filed March 22, 1905.

As stated in my prior patent and prior application, a phonograph consisting, essentially, of means for causing a record to transmit the sounds impressed upon it into vibrations upon a disk of flexible material, technically called a "reproducer," and a sound-conveyer consisting of one or more parts for conducting the sound-waves made by the reproducer away from the reproducer and for amplifying the same is commercially unsatisfactory, for the reason that the sounds delivered by the sound-conveyer are too loud or large in volume for use in ordinary rooms; and the object of my invention is to provide means for reducing the volume of sound-waves passing from the reproducer proper through the sound-conveyer, so that the volume of sound will be reduced without the purity of tone being injured.

As shown in Figures 11, 12, 13, and 14 of said prior application, Serial No. 251,470, my invention consists in the use of a valve in the sound-conveyer consisting of a sheet or plate of imperforate material so mounted adjacent to an opening in the side of some portion of the sound-conveyer that it can be moved to a position in which it lies crosswise of or obstructs the sound-wave passage of the sound-conveyer. In its preferred form my invention consists in the use of such a plate-valve in combination with a novel form of mechanism

for moving the plate of the valve backward and forward between opened and closed position.

More in detail, my invention consists in an article of manufacture comprising a plate with a hole in it, with a valve-plate mounted in a recess in said supplemental plate to close said hole, the whole being so constructed that it may be inserted at some convenient point in the sound-conveyer of the phonograph. The word "sound-conveyer" as here used throughout the specification and claims means any part of the passage-way through which the sound-waves pass after they leave the reproducer-diaphragm.

Still more in detail, my invention consists in details of construction to be hereinafter more fully described and claimed as the specification proceeds.

As my prior application and patent both show a complete phonograph, I have only here shown such portions as are necessary to a clear understanding of my invention.

Referring to the drawings, Fig. 1 is a plan view of a portion of a phonograph corresponding, except as to the mechanical means for moving the valve-plate, to Fig. 11 of my said prior application. Fig. 2 is a sectional plan view through the reproducer and valve-plate-operating mechanism, taken on the horizontal central plane of Fig. 1. Fig. 3 is a detail sectional end view taken on line 3 of Fig. 2. Fig. 4 is a side view of the valve mechanism proper removed from the phonograph. Fig. 5 is a side view of the simplest form of my mechanism, the same being identical with Fig. 12 of my said prior application. Fig. 6 is a horizontal sectional view taken on line 6 of Fig. 5, the same being identical with Fig. 13 of my said prior application. Fig. 7 is a detail view of a modified form of my invention in which the valve-plate is pivotally mounted.

The numeral 10 indicates the ordinary or outer portion of a phonograph, commonly called a "horn," terminating at the right beyond the figure in a bell (not shown) and at its other end in a head or sound-box composed of two parts 11 and 12, inclosed by a cap 14, corresponding to the cap 32 of my prior patent and the cap 50 of my prior application, the reproducer-disk proper (not shown) being located within the cap at or

about the flange 15. Inside the parts just described there is a clear passage-way 16 leading from the reproducer-disk proper to the bell of the horn, this whole passage-way constituting actually and practically the sound-conveyer.

In order to restrict the volume of sound-waves passing through the sound-conveyer, I insert at some convenient point between the reproducer and the bell of the horn, preferably between the parts 11 and 12 of the head or sound-box, a supplemental disk 20, having cut in one portion a longitudinal parallel-sided recess 21, in which is slidably fitted a valve-plate 22, adapted to slide edge-wise backward and forward in this recess 21 to open and close a hole 24 in the disk 20, lying in and forming a part of the sound-conveyer passage-way 16 of the horn. This closing may be effected by the end of the valve-plate, preferably cut in a curved line, as in Fig. 4, by the circular edge of a hole 27, cut in the plate intermediate of its ends, as shown in Fig. 5, or by the side 28 of the valve-plate when it is pivotally mounted at one side of the hole 24, as in the modified form of Fig. 7. This flat disk or plate 22 may in its simplest form (shown in Figs. 5 and 6) be moved by hand, the operator taking hold of the end of the plate from the open position of said figures to a position in which the solid portion of the plate closes the hole 24 and back to original position. In order to give such plate a more readily adjustable slow movement, I prefer to provide some form of slow-motion mechanism, one form of which is illustrated in Figs. 1 to 4, inclusive. This consists in a rod or shaft 30, suitably journaled in lugs or flanges 31 upon the sides of the plate 20, (preferably made by bending portions of the plate to the desired position,) there being on the end of the shaft a milled wheel 32, adapted to be taken hold of by the operator to rotate the shaft. In the middle of the shaft is a small pinion 34, meshing with a rack 35 upon the upper face of the plate 22, so that when the thumb-screw 32 is rotated the motion is transmitted through the pinion 34 to the rack 35, with the result that the plate 20 is given corresponding slow motion in either direction depending upon the direction of rotation of the wheel 32. Any of the ordinary forms of slow-motion device may be used for moving this plate 20 without departing from the spirit of my invention.

In Fig. 7 I have shown an alternative construction in which the valve-plate is pivotally mounted upon the bearing 37, so that it can by properly moving the handle 38 be moved from the position shown in the figure, in which the hole 24 is partially closed, either to a position in which that hole is completely open or to a position in which it is closed.

For commercial purposes I prefer to make my valve mechanism consisting of the plate

20, the valve-plate 22, and the mechanism for operating said valve-plate as a separate article of manufacture, so that it can be sold to dealers of different kinds of phonographs and inserted by them between suitable splice-plates or flanges, of which the portions 11 and 12, here shown, are illustrative samples in the sound-conveyers of their phonographs.

In order to secure the device of my invention in proper position between the parts of any phonograph sound-conveyer, I provide suitable screw-holes 40, through which any suitable screws may be inserted to secure the plate 20 in position between the adjacent parts of the phonograph sound-conveyer. These holes 40 may be given any convenient location so long as they do not interfere with the operative mechanism of the valve.

While I prefer to locate my valve mechanism in close proximity to the reproducer, it may be located at any point desired between the reproducer and the bell of the horn. While I have referred to the valve-plate as moving from wide-open to completely-closed position, it should be understood that there is a more or less gradual reduction of the sound-waves passing through the sound-conveyer as this motion toward closing takes place. In order that this diminution of sound may be very gradual as the fully-closed position is reached, I prefer to make the curvature 26 of the plate in Figs. 4 and 5 as shown and to put a notch 41 upon the side of the pivoted plate of Fig. 7.

I claim—

1. In a phonograph in combination with a record, a reproducer in operative connection therewith and a sound-conveyer attached to said reproducer, a valve-plate mounted adjacent to said sound-conveyer in a plane substantially at right angles thereto adapted to be moved into and out of the path of sound-waves within the sound-conveyer to open and close said passage-way, a rack upon the plate a pinion meshing with said rack and means for rotating said pinion, whereby said plate may be given a gradual motion in either direction between its two adjustable positions.

2. A sound-modifier consisting of a supplemental plate adapted to be secured between two parts of a phonograph sound-conveyer there being a hole in said supplemental plate adapted to register with the sound-wave passage-way through the sound-conveyer and a valve-plate mounted in a recess in said supplemental plate adapted to be moved edgewise in the plane of the supplemental plate between two different positions to open and close said hole in the supplemental plate.

3. A sound-modifier consisting of a supplemental plate, adapted to be secured between two portions of a phonograph sound-conveyer there being a hole in said plate adapted to register with the passage-way for sound-waves through the sound-conveyer and a

valve-plate slidably mounted in a recess in said supplemental plate adapted to be moved edgewise in the plane of the supplemental plate backward and forward between two different positions to open and close said hole in the supplemental plate.

4. A sound-modifier consisting of a supplemental plate, adapted to be secured between two portions of a phonograph sound-conveyer there being a hole in said plate adapted to register with the passage-way for sound-waves through the sound-conveyer and a valve-plate slidably mounted in a recess in said supplemental plate adapted to be moved backward and forward in the plane of said plate between two different positions to open and close said hole in the supplemental plate, and a slow-motion device for moving said

valve-plate backward and forward between its two positions. 20

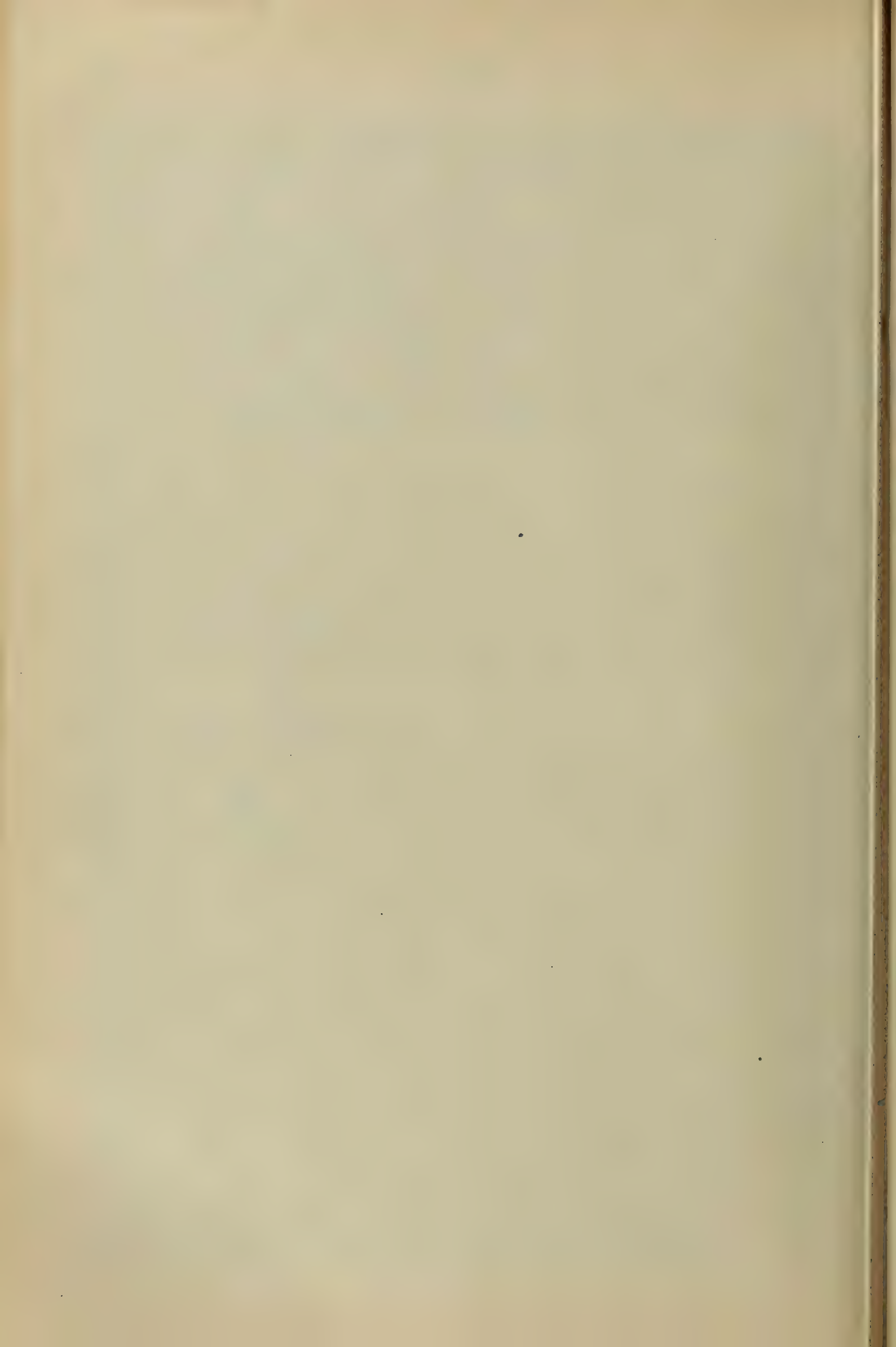
5. A sound-modifying device comprising a relatively fixed base-plate provided with a sound-conveying opening and provided with means for securing the said plate within a sound-conveyer, a valve-plate adjustably mounted upon said fixed plate and means operable from without said conveyer for adjusting the position of said valve-plate relatively to the opening in said fixed plate. 25

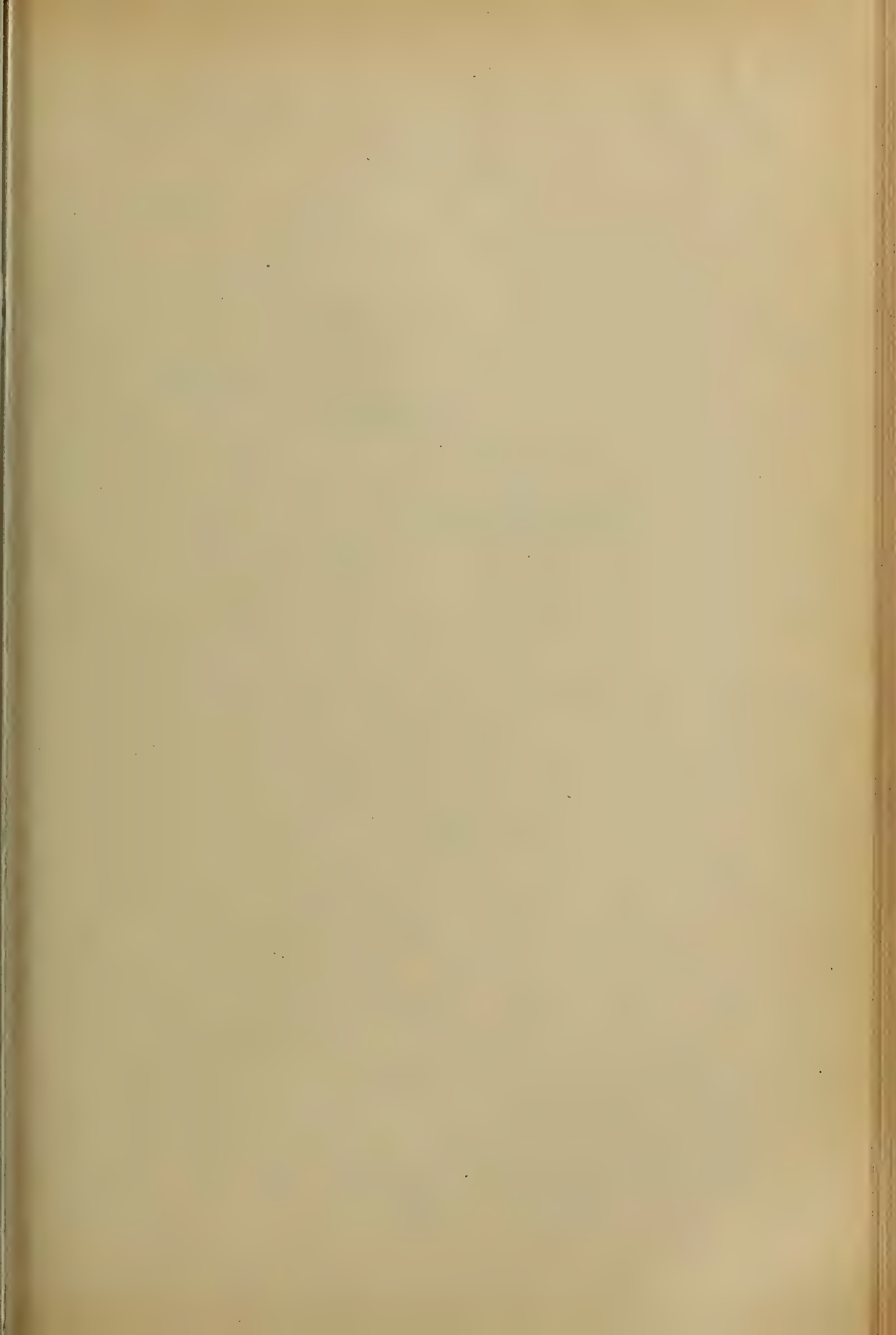
In witness whereof I have hereunto subscribed my name in the presence of two witnesses. 30

EUGENE M. ROBINSON.

Witnesses:

DWIGHT B. CHEEVER,
HOWARD M. COX.





No. 831,344.

PATENTED SEPT. 18, 1906.

C. HILGENBERG.
GRAMOPHONE.

APPLICATION FILED DEC. 1, 1905.

2 SHEETS—SHEET 1.

Fig. 1

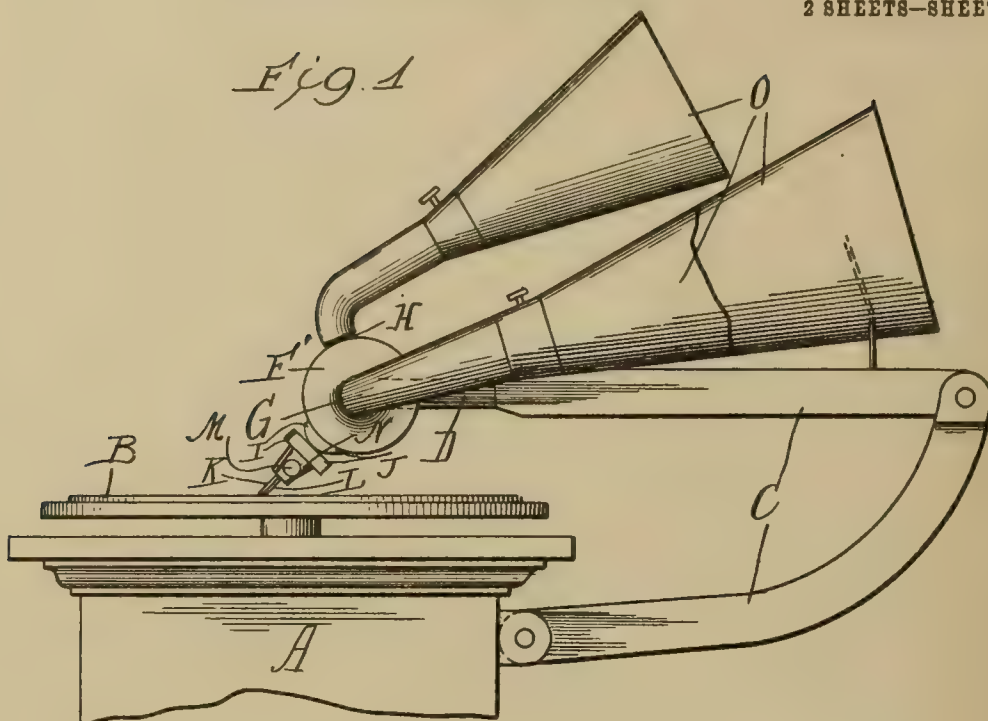
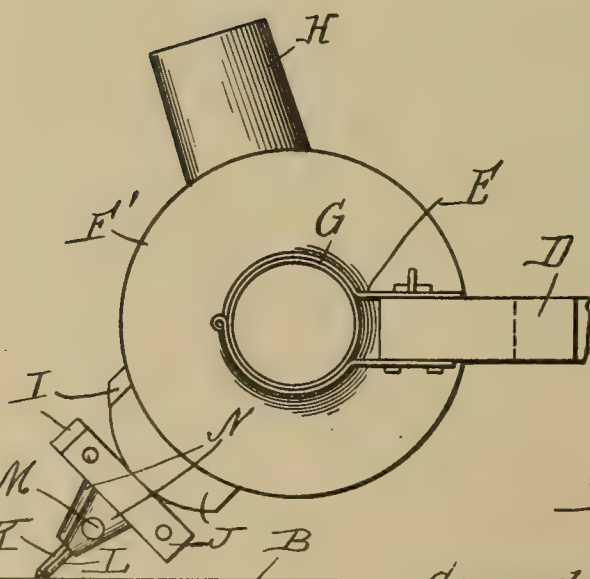


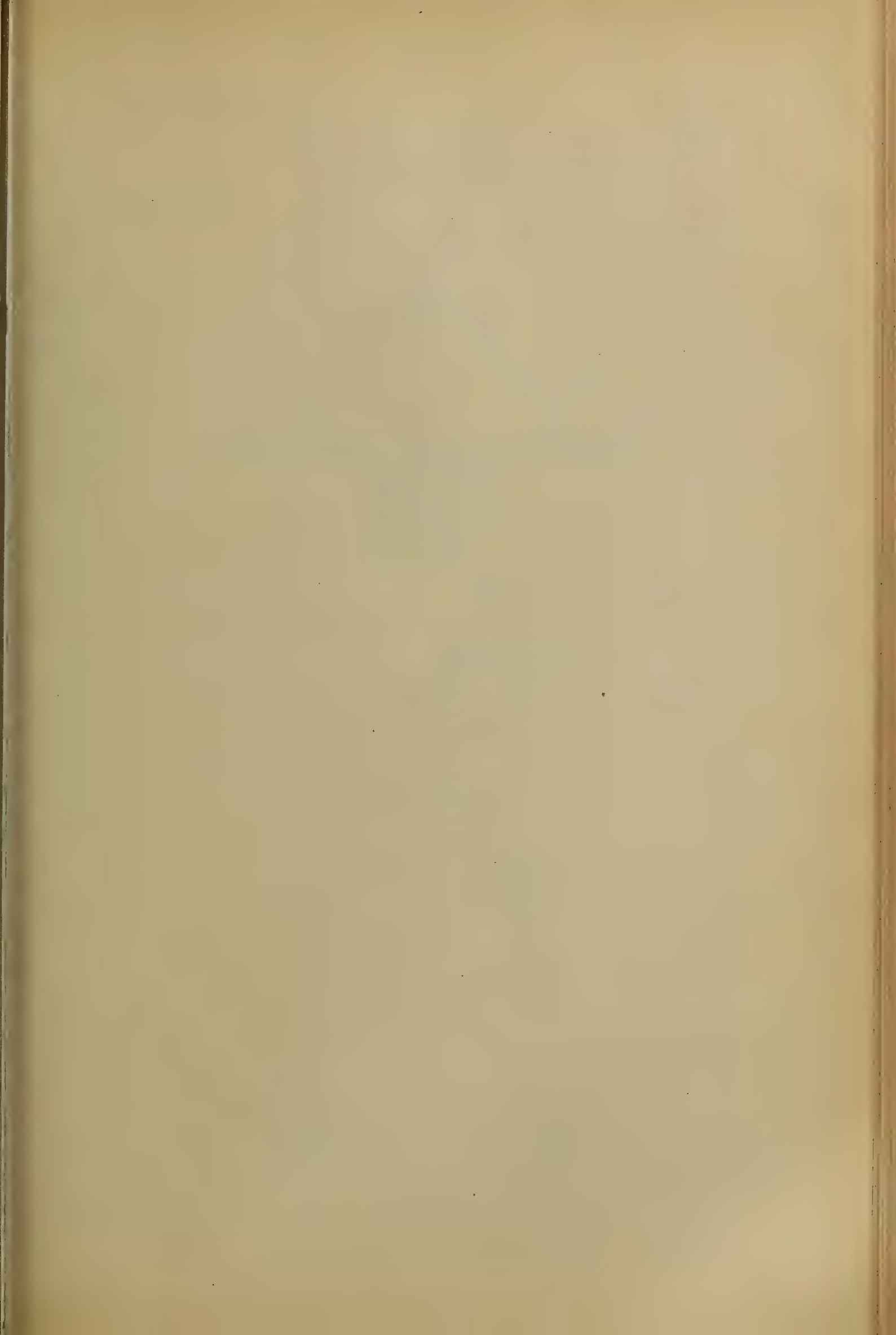
Fig. 2.



Witnesses
Hamp R. Lusk
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Inventor:
Conrad Hilgenberg.

By Morgan & Primister Attys



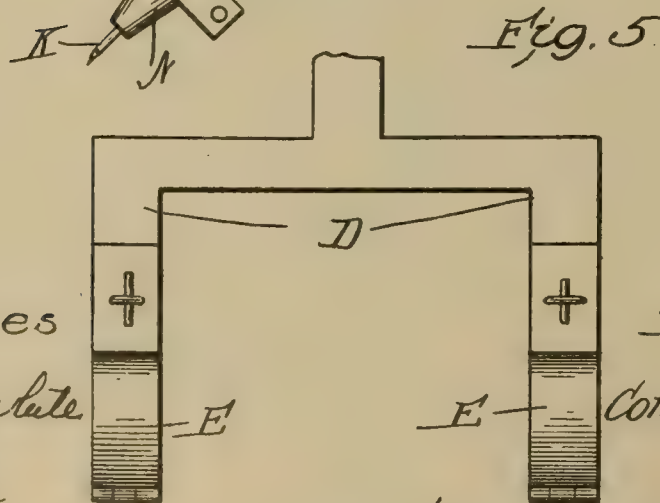
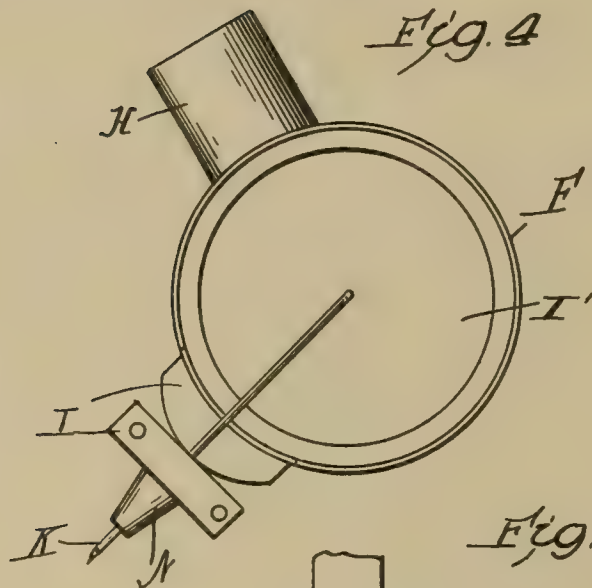
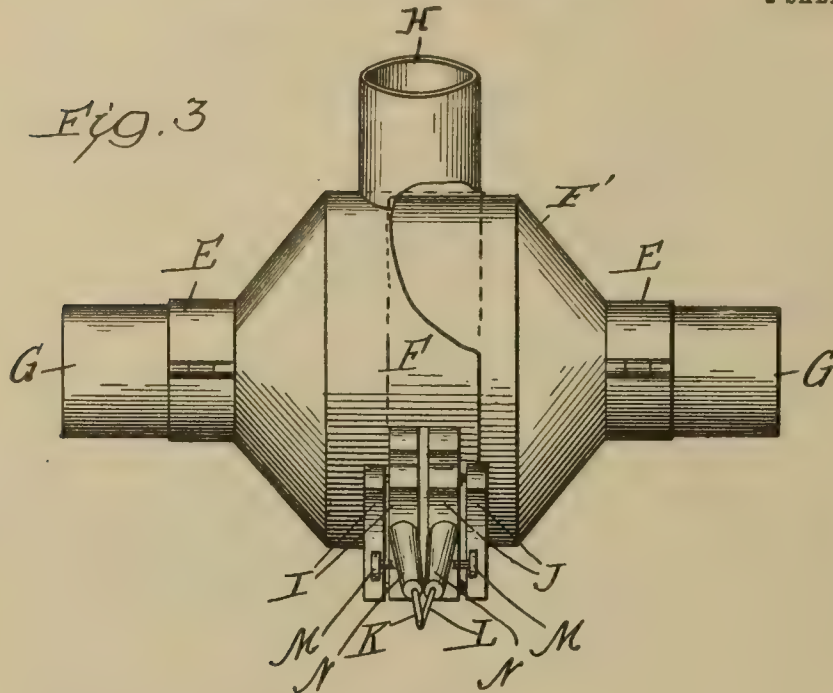
No. 831,344.

PATENTED SEPT. 18, 1906.

C. HILGENBERG.
GRAMOPHONE.

APPLICATION FILED DEC. 1, 1905.

2 SHEETS—SHEET 2.



Witnesses
Harry R. L. White
Ray White.

Inventor:
Conrad Hilgenberg

By Morgan & Primister, Attys

UNITED STATES PATENT OFFICE.

CONRAD HILGENBERG, OF CHICAGO, ILLINOIS.

GRAMOPHONE.

No. 831,344.

Specification of Letters Patent.

Patented Sept. 18, 1906.

Application filed December 1, 1905. Serial No. 289,842.

To all whom it may concern:

Be it known that I, CONRAD HILGENBERG, a citizen of the United States, residing at No. 96 Twenty-fourth Place, in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Gramophones, of which the following is a specification.

My improvement relates to that part of the gramophones described as the "reproducer" and the connections with that part and the horns.

The object of my invention is to increase the volume of sound and improve the tone of the instrument. The manner in which I accomplish this object is described in the following specification, and illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the gramophone, showing the reproducers, connections, and horns in position supported by the bracket and in contact with the "record." Fig. 2 is a full-size side view of the reproducers, showing the relative positions of the needle-points on the record and part of the supporting bracket fork and clamp. Fig. 3 is a front view of the reproducers and conical box inclosing them, showing the relative position of the needle-points and connections for the horns. Fig. 4 is an inside face view of one of the reproducers. Fig. 5 is a detail view of the supporting bracket fork and clamps.

In the drawings, A represents the gramophone-box containing the revolving mechanism which supports and rotates the record B. Adjustably attached to this box is a double bracket C. At the free end of this bracket is a fork D. To each end of this fork a circular hinged clamp E is attached. Supported in these clamps is a double-cone sound-box comprising telescopic sections F and F', having tubular extensions G, which are adapted to form connecting supports for the horns, as shown in Figs. 1 and 3. Projecting from the periphery of the section F is another tubular extension H, which is also adapted to support a horn, as shown in Figs. 1, 2, and 3. Supported within this conical box are two reproducers, (indicated as a whole by I and J,) and which fit closely in the inner ends of the said sections and the arms of which project outwardly through openings in the peripheries of said sections and are held from lateral movement by the frictional contact of the reproducers with the

inside of the box-sections. The inside faces of the reproducers are so adjusted in relation to each other as to permit of the free vibration of the diaphragms I I of said reproducers. The back of each diaphragm is uncovered except by the conical box-section and is therefore free to transmit the full force of the vibrations into each part of the box. The reproducers are also so adjusted in the box-sections F and F' that the ends of the needle-points K and L are in tandem, as shown in Figs. 2 and 3, and are so close together that vibrations produced by the record and the two producers blend together. The adjustment of the needle-points K and L is the same as in the ordinary reproducer except that the set-screws M are on the opposite side of the holder N, as shown in Figs. 2 and 3. To support the reproducers, conical box-sections, extensions, and horns in addition to the ordinary double bracket C, I provide a fork D, which may be attached to or made an integral part of the bracket C. The inside width of this fork is equal to the full length of the box F. On the ends of this fork clamps E are affixed, as shown in Figs. 2, 3, and 5. These clamps may be of any form of construction that is adapted to encircle the extensions G of the box F and permit of the free removal and exact adjustment of the box F and reproducers it contains and to hold them securely when adjusted.

It is obvious that the box F must be made in separate parts to permit of the adjustment therein of the reproducers and that this separation may be arranged in several ways; also, that these parts when put together with the reproducers in place may be either attached together or be permanently affixed to each other. I have not described or illustrated any one of these forms of construction, and as the possible variations do not affect the object of my invention or change the result I reserve the right to use any of the methods of constructing and joining the several parts of this conical box F. The same is true of the clamps E, and I reserve the right to vary the construction of these parts. I also reserve the right to close the connection H with a cap and to use two or three horns O, as I may desire.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a gramophone of the kind described,

the combination comprising a box A, rotating mechanism and record B; a bracket C attached to said box; a fork D attached to the free end of said bracket; a pair of clamps E attached to the ends of said fork; a double conical box having two tubular extensions G, and a tubular connection H projecting from the periphery of said box, said extensions and connection being adapted to be connected with the horns O; said box being supported in the clamps E, fork D and bracket C; a pair of reproducers I and J adjustably supported and partly inclosed in said conical box, needle-points K and L on said reproducers arranged in tandem and close together; and a plurality of horns having suitable connections adapted to fit the tubular extensions G and connection H, substantially as described and for the purposes specified.

2. In a gramophone of the kind described the combination consisting of a box A; rotating mechanism and record B; a supporting-bracket C; a fork D attached to said bracket, a double conical box supported in said fork and said box having a plurality of extensions adapted to support horns O, and being adapted to inclose and support a pair of reproducers; a pair of reproducers partly inclosed and supported by said conical box, needle-points on said reproducers being so arranged in said box that the needle-points are

in tandem and close together substantially as described and for the purposes specified.

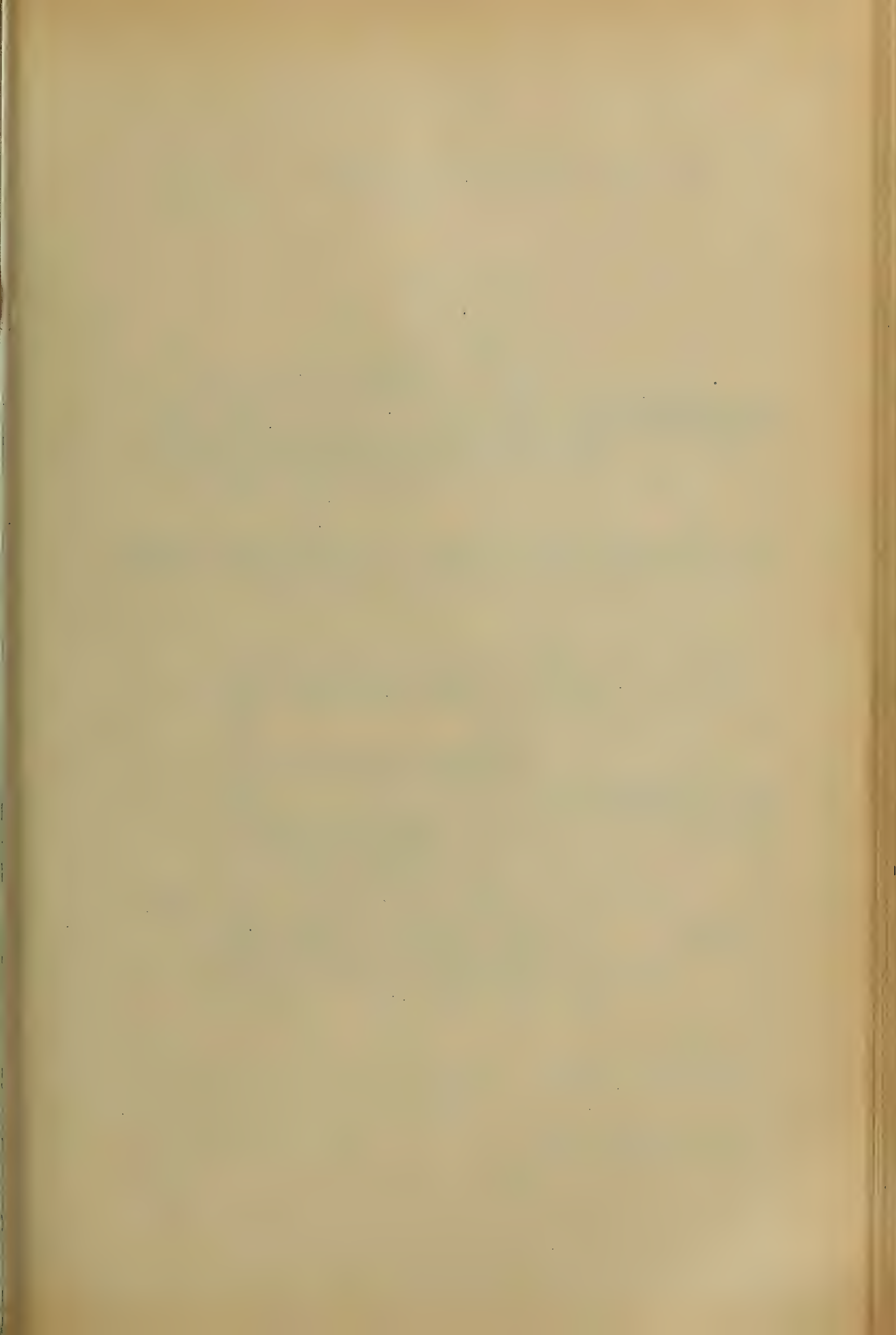
3. In a gramophone of the kind described, the combination with the box A, rotating mechanism and record of a supporting-bracket having a fork D adapted to support the reproducers, box F and horns; a pair of reproducers; needle-points on said reproducers so arranged and supported that they are held in tandem and close together on said record; a double conical box, inclosing said reproducers, said box having a plurality of extensions adapted to support several horns and a plurality of horns connected with said box extensions, substantially as described and for the purposes specified.

4. In a graphophone of the kind described the combination with the box A, rotating mechanism, record B and supporting-bracket C; of a double-ended conical box having a plurality of tubular connections adapted to support several horns; and a pair of reproducers inclosed in said box; needle-points on said reproducers so adjusted that they are held in tandem and close together at the points where they are in contact with the record, substantially as described and for the purposes specified.

CONRAD HILGENBERG.

Witnesses:

JOSEPH STAAB,
THOMAS J. MORGAN.



No. 831,455.

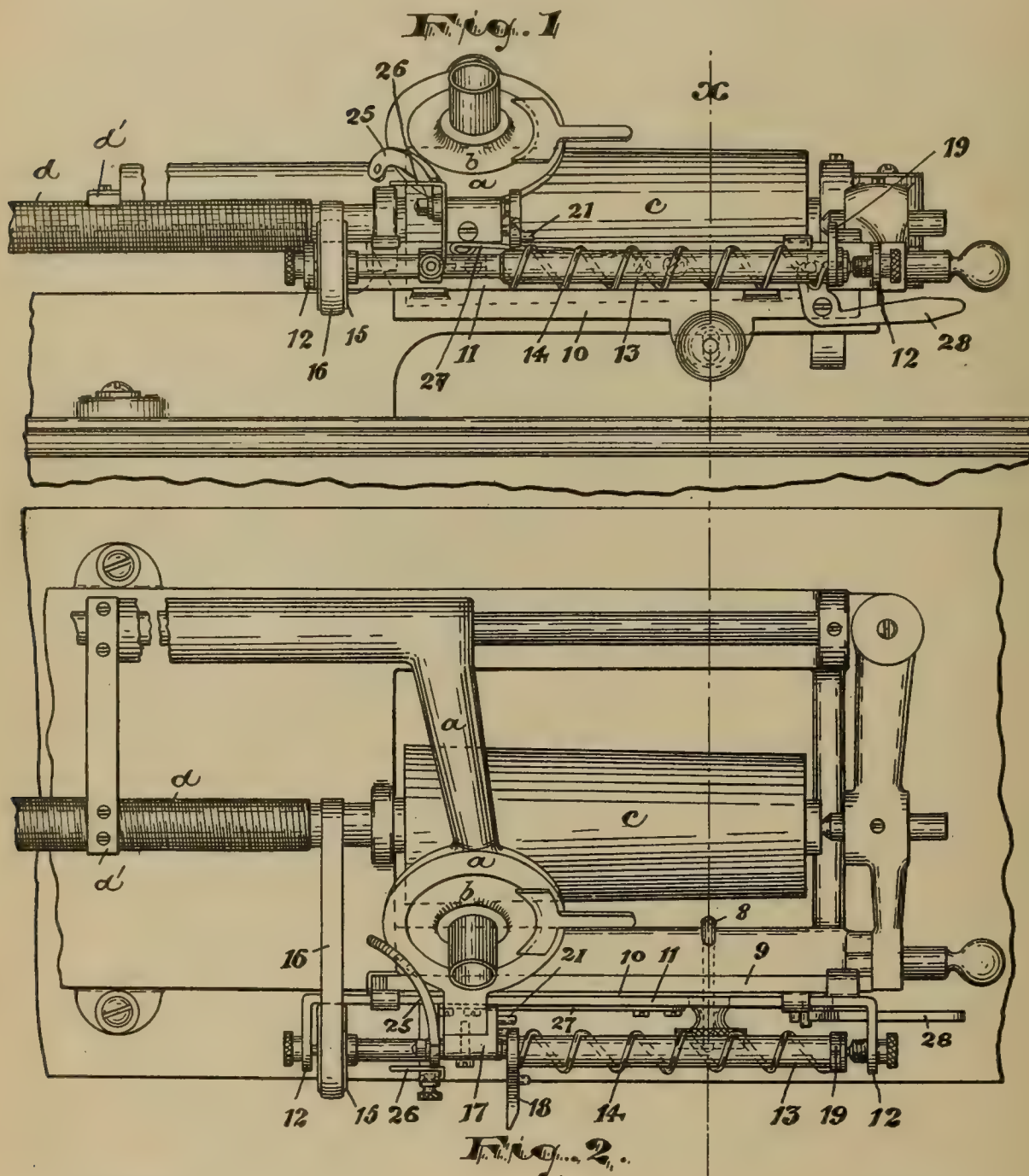
PATENTED SEPT. 18, 1906.

T. F. MORRISSEY.

RETURNING DEVICE FOR PHONOGRAPHS AND OTHER TALKING MACHINES.

APPLICATION FILED JUNE 16, 1903.

2 SHEETS—SHEET 1.



WITNESSES:

Ralph Lancaster.

Russell M. Everett.

INVENTOR:

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Charles H. Fell

ATTORNEY.

No. 831,455.

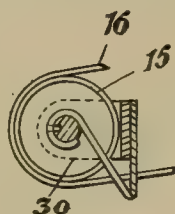
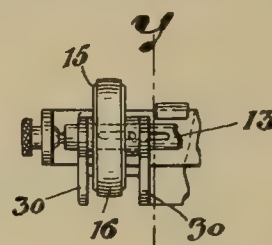
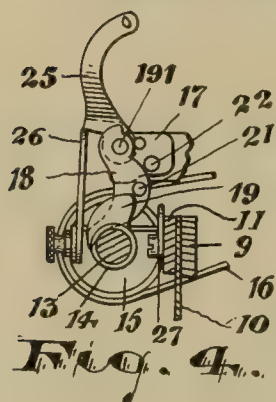
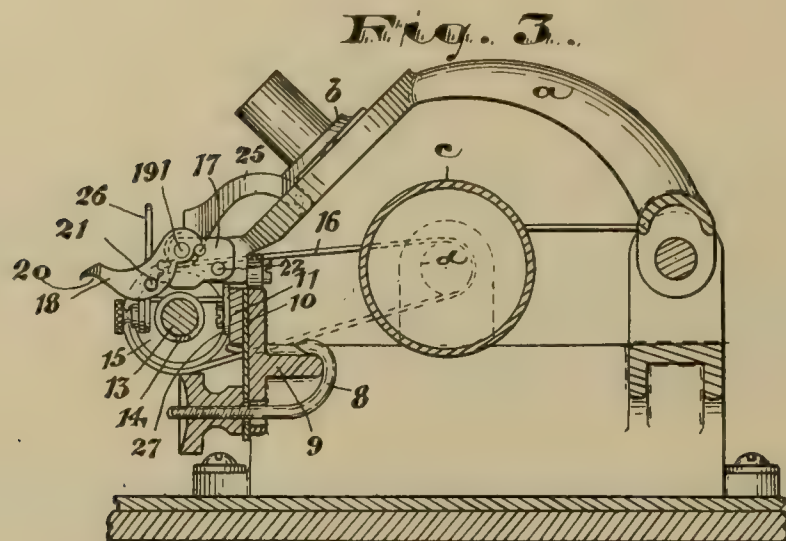
PATENTED SEPT. 18, 1906.

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RETURNING DEVICE FOR PHONOGRAPHS AND OTHER TALKING MACHINES.

APPLICATION FILED JUNE 16, 1903.

2 SHEETS—SHEET 2.



WITNESSES:

Ralph Lancaster.

Russell M. Everett.

INVENTOR

Thomas F. Morrissey.

BY

Charles H. Bell.

ATTORNEY.

UNITED STATES PATENT OFFICE.

THOMAS F. MORRISSEY, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO
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CORPORATION OF NEW YORK.

RETURNING DEVICE FOR PHONOGRAPHS AND OTHER TALKING-MACHINES.

No. 831,455.

Specification of Letters Patent.

Patented Sept. 18, 1906.

Application filed June 16, 1903. Serial No. 161,646.

To all whom it may concern:

Be it known that I, THOMAS F. MORRISSEY, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented and produced a new and original Improvement in Returning Devices for Phonographs and other Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure automatically a return of the reproducer or speaker of a talking-machine to an initial position in said talking-machine after the stylus of said speaker or reproducer has traversed the record, whereby said stylus will again be enabled to traverse said record and repeat the sounds to be reproduced, to perform said function more perfectly and at a reduced cost of construction, and to secure other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

Referring to the accompanying drawings, in which like characters of reference indicate corresponding parts in each of the several figures, Figure 1 is a front elevation of a portion of a phonograph to which my improvements are attached. Fig. 2 is a plan of the same. Fig. 3 is a section taken on line *x*. Fig. 4 is a detail sectional view showing a returning-dog in engagement with a screw-shaft, the section being on line *x* of Fig. 1, but with the parts in a different position from that shown in Fig. 1. Fig. 5 is a detail showing a certain modification of construction; and Fig. 6 is a section of the same, taken on line *y*.

In said drawings, *a* indicates the reproducer-arm, *b* the reproducer or speaker, *c* the record-holder, *d* the feed-screw shaft in axial alinement with and adapted to turn with said record-holder, all of which are of usual construction and adapted to operate in connection with motive means in any ordinary manner.

Upon the frame 9 of the machine at the front thereof is arranged a bracket 10, which

is separably fastened by a nut or clamp 8, said bracket having a slideway, in or on which is a bracket extension 11, slidable in a direction parallel with the axis of the record-holder, the movement being limited but of sufficient scope to enable the device to be adjusted to suit the various positions of the records on their holders. The said bracket extension 11 is provided with forwardly-extending arms 12, furnishing end bearings for the screw-shaft 13, which is preferably a shaft with a wire 14 coiled around it and secured thereon. At one end of said shaft is a pulley 15, adapted to receive a belt 16, which last extends to and takes its power from the screw-shaft *d* or from any rotary part of the talking-machine. At the opposite end of the shaft 13 from the pulley is a tripping-finger 19, adapted to engage the returning-dog 18, as hereinbefore described. The shaft 13 constitutes a return-screw or return-feed shaft, the coiled wire or other threads of this shaft being disposed to effect a return movement of the reproducer when the said threads are engaged by the returning-dog 18, which I will now proceed to describe.

At the front of the reproducer-arm is secured a removable bearing block or piece 17, on which is pivoted the returning-dog 18. From the pivot 191, which extends parallel to the feed-screw *d*, the dog extends downward and forward an inch, more or less, and is provided near its free extremity with a concavity or recess 20, (shown clearly in Fig. 3,) adapted to fit the convex periphery of the shaft 13, the concavity being so formed that the dog will remain on the shaft while the spiral thread 14 pushes laterally on said dog and forces it, together with the reproducer-arm *a* and the attachments with which said dog is connected, to the initial position desired. The said dog has a laterally-extending pin or projection 21, adapted to be engaged by the tripping-finger 19 when the screw-shaft *d*, with its nut *d'*, forces the reproducer-arm, and with it the said returning-dog 18, laterally, so that said pin or projection 21 is brought into the line or plane of movement of said tripping-finger. When the parts are brought to said plane of engagement, said tripping-finger forces the dog rearwardly onto the shaft 13, thereby lifting the dog and bringing it into the position shown in Fig. 4, in which it will rest on the shaft

with the recess 20 in engagement therewith. Here said dog is held because of the direction of the movement of the shaft and because of the stop projection 22, which prevents it from passing out of its engaging relation. By the raising of the dog the feed-nut d' and the reproducer-arm a are also raised, and the dog being then held upon the shaft it holds the feed-nut d' away from the screw-shaft d and the reproducer a little way from the record (not shown) on the holder d , so that a return movement of the reproducer-arm and its reproducer can be effected without scraping or otherwise injuring the screw-shaft or the record.

Immediately upon the dog 18 being thrown into engagement with the screw-shaft 13 the said dog is engaged by the spiral thread or wire 14, and thus said dog is driven to its initial position, as before described. At said initial position the screw-shaft 13 may be devoid of threads, the threads 14 terminating so that further return movement is avoided. Upon the pivot 191 of the dog is also fastened a weighted tripping-lever 25, adapted when the dog has arrived at its initial position to engage an adjusting-arm 26 and throw said dog outward away from the screw-shaft 13, so that the nut d' and the stylus of the reproducer are permitted to drop upon the screw-shaft d and the record, respectively, and thus immediately and automatically begin a repetition of the talking or musical reproduction.

To cushion the falling movement of the reproducer-arm and stylus, so that the latter will not indent or otherwise injure the record, I have provided a cushioning-spring 27, which is attached at one end to the bracket extension 11, and at its free end lies so as to receive the weight of the reproducer-arm when the dog is thrown away from supporting relation thereto. The sliding extension 11 is preferably moved in its slideways by an adjusting-lever 28, as shown in Figs. 1 and 2, and thus the returning devices described may be brought into proper operative relation to the record lying in one of various positions within a limited field on said holder.

I prefer to arrange the pulley 15 automatically adjustable on its shaft 13, as indicated in Figs. 5 and 6, in which case the shaft is longitudinally slotted, and the pulley is provided with a spline or key permitting the pulley to move under the power of the belt 16, so as to assume a position of proper relation even though the shaft is adjusted longitudinally, as above described. The pulley is when loose held between arms 30, extending out from the bracket 10.

It will be understood that the term "phonograph" is used herein as a broad term to include all sound-reproducing machines to which the invention is or may be found applicable.

Having thus described the invention, what I claim as new is—

1. The combination with the frame, having a record-holder, speaker or reproducer and means for moving said speaker or reproducer lengthwise of the axis of said holder, of a screw-shaft arranged parallel with the said axis of the holder, and having at one end a lifting-finger, means for turning said screw-shaft, a pivoted dog carried by the reproducer-carrier and adapted to support the reproducer-carrier in a raised position by engagement with said screw-shaft, and adapted to be thrown into coöperative engagement with said screw-shaft by said lifting-finger, whereby the threads of the said screw-shaft will cause the said dog and the reproducer attached thereto to travel lengthwise of the said holder in a direction contrary to that taken by the reproducer in its reproducing operations, substantially as set forth.

2. The combination with the frame having a record-holder, speaker or reproducer, and means for moving said speaker or reproducer lengthwise of the axis of said holder, of a screw-shaft arranged parallel with the axis of the holder and having at one end a lifting-finger, means for turning said screw-shaft, a pivoted dog mounted to move with the reproducer-carrier and adapted to support the reproducer-carrier in a raised position by engagement with said screw-shaft and adapted to be thrown into coöperative engagement with said screw-shaft by said lifting-finger, whereby the threads of the said screw-shaft will cause the said dog and the reproducer-carrier to travel lengthwise of said holder in a direction contrary to that taken by the reproducer-carrier in the reproducing operation.

3. The combination with the frame of a talking-machine having a rotary record-holder, a reproducer-arm movable in the direction of the axis of said holder, a screw-shaft and nut for moving said arm and rotating said holder, said arm having a pivotal dog adapted to be tripped at opposite limits of movement of said arm, a returning screw-shaft arranged on a separable bracket at the front of said frame and providing a lifting-finger to trip or engage the pivotal dog and effect an engagement of said dog with said screw-shaft, an arm 26, to throw said dog away from said shaft, and power-transmitting means for operating the last said screw-shaft.

4. The improved returning device for phonographs, comprising a spiral shaft having a lifting-finger, means for operating said spiral shaft a pivoted dog adapted to be raised by the lifting-finger onto said spiral shaft and to support the reproducer-carrier of the phonograph when raised onto the spiral shaft, and means for throwing said dog from said spiral shaft, substantially as set forth.

5. The improved returning device for phonographs, comprising a spiral shaft having a lifting-finger at one end, means for turning said shaft, a pivotal, recessed dog adapted to be pivoted upon the free end of the reproducer-arm and having a laterally-extending pin adapted to be engaged by the said lifting-finger at the end or limit of effective movement of said reproducer, said lifting-finger being adapted to raise said dog and throw the recessed end of said dog onto said shaft, whereby said screw-shaft will effect a return movement of the reproducer, substantially as set forth.

6. The improved returning device for phonographs, comprising a spiral shaft having at one end a lifting-finger, and means for returning the shaft, means for detachably fastening the said spiral shaft to the frame of the talking-machine, a dog adapted to be attached to the free end of the speaker-arm and adapted to engage the spiral shaft to impart a return movement to the speaker-arm, and to support the speaker-arm during its return movement, and means for throwing said dog into engagement with the spiral shaft at one end of the path of movement of said speaker-arm and for throwing the dog away from the spiral shaft at the opposite end of said path of movement, and means for communicating power to the pulley.

7. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer and to support the reproducer during its return movement, and means rotating with said shaft for engaging said device to raise the reproducer and to turn said device to bring its thread-engaging part into engagement with the thread of the return-feed shaft, substantially as described.

8. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means for engaging said device to raise the reproducer and to turn the device to bring its thread-engaging part into engagement with the thread of return-feed shaft substantially as described.

9. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the

return-feed shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means for raising the reproducer at the end of the reproducing movement thereof and for turning said device to bring its thread-engaging part into engagement with the thread of the return-feed shaft, substantially as described.

10. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a member mounted to move with the reproducer-carrier, and to move independently of its movement with the carrier in a direction at substantially right angles to the line of the return-feed shaft, and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means for raising the reproducer at the end of the reproducing movement thereof and for moving said member to bring its thread-engaging part into engagement with the thread of the return-feed shaft, substantially as described.

11. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a member mounted to move with the reproducer-carrier and having a part for engaging the thread of the return-feed shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means rotating with the return-feed shaft to cause said member to be moved to raise the reproducer and to bring the thread-engaging part of said member into engagement with the thread of the return-feed shaft.

12. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a pivoted member mounted to move with the reproducer-carrier and having a part for engaging the thread of the return-feed shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means rotating with the return-feed shaft to cause said member to be moved to raise the reproducer and to bring the thread-engaging part of said member into engagement with the return-feed shaft.

13. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a member mounted to move with the reproducer-carrier and movable at substantially right angles to the line of the return-feed shaft and having a part for engaging the thread of the return-feed shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, and means rotating with the return-feed shaft for engaging said member to raise the reproducer from the record and to move said member trans-

versely to the return-feed shaft to bring its thread-engaging part into engagement with the thread of the return-feed shaft.

14. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft and having an eccentric or cam periphery and a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier, and means for turning said device to bring successive portions of its cam-periphery into supporting engagement with the return-feed shaft to raise the reproducer from the record and to bring the thread-engaging portion of said device into engagement with the thread of the return-feed shaft.

15. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier, and means for turning said device to bring successive portions thereof into supporting engagement with the return-feed shaft to raise the reproducer from the record and to bring the thread-engaging portion of said device into engagement with the thread of the return-feed shaft.

16. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft and having an eccentric or cam periphery, and means for turning said device to bring successive portions of its cam-periphery into supporting engagement with the return-feed shaft to raise the reproducer from the record.

17. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return-feed shaft, and means for turning said device for bringing successive portions thereof into supporting engagement with the return-feed shaft to raise the reproducer from the record.

18. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a member mounted to move with the reproducer-carrier and movable independently of the reproducer-carrier in a direction substantially at right angles to the line of the return-feed shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier, and means for moving said device to

bring successive portions thereof into supporting engagement with the return-feed shaft to raise the reproducer from the record and to bring the thread-engaging part of said device into engagement with the thread of the return-feed shaft.

19. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a revoluble member mounted to move with the reproducer-carrier and having an eccentric or cam periphery and a part for engaging the thread of the return-feed shaft, and means for turning said member at the end of the reproducing movement of the reproducing-arm to cause successive portions of its cam-periphery to engage the return-feed shaft to raise the reproducer from the record and to bring the threaded engaging portion of said member into engagement with the thread of the return-feed shaft, and means for disconnecting said member from the return-feed shaft when the reproducer-carrier has been returned to normal position.

20. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, and a revoluble lifting device mounted to turn at substantially right angles to the line of the return-feed shaft, said device having an eccentric or cam peripheral surface adapted to bear on the return-feed shaft and successive portions of which successively engage the surface of the return-feed shaft for lifting the reproducer-carrier, substantially as described.

21. The combination with the reproducer-carrier of a phonograph, of a threaded return-feed shaft, a device for coacting with the return-feed shaft for raising the reproducer from the record and having a part to coact with the thread of the return-feed shaft for returning the reproducer-carrier to normal position, and means for moving said device to cause it to coact with the return-feed shaft to raise the reproducer from the record and to bring said device into position to coact with the thread of the return-feed shaft for the return movement of the reproducer-carrier.

22. In a phonograph the combination with the reproducer-carrier, feed-nut, feed-screw and a return-screw, of a dog mounted to move with the reproducer-carrier and carried by a pivot parallel to the return-screw and adapted to engage the thread of the return-screw to impart a return movement to the reproducer-carrier and to support the reproducer-carrier during its return movement, and means for engaging said dog, raising it and moving it into coöperative engagement with the return-screw, substantially as described.

23. In a phonograph, the combination with the reproducer-carrier, feed-nut, feed-screw and a return-screw, of a dog mounted to move with the reproducer-carrier and carried by a pivot parallel to the return-screw and adapt-

ed to engage the thread of the return-screw to impart a return movement to the reproducer-carrier and to support the reproducer-carrier during its return movement, and adjustable means for engaging said dog, raising it and moving it into coöperative engagement with the return-screw, substantially as described.

24. In a phonograph, the combination with the reproducer-carrier, feed-nut, feed-screw and a return-screw, of a dog mounted to move with the reproducer-carrier and carried by a pivot parallel to the return-screw, and adapted to engage the thread of the return-screw to impart a return movement to the reproducer-carrier and to support the reproducer-carrier during its return movement, and means carried by the return-screw for engaging said dog, raising it and moving it into coöperative engagement with the return-screw, substantially as described.

25. In a phonograph, the combination with the reproducer-carrier, feed-nut, feed-screw and a return-screw, of a dog mounted to move with the reproducer-carrier and carried by a pivot parallel to the return-screw and adapted to engage the thread of the return-screw to impart a return movement to the repro-

ducer-carrier and to support the reproducer-carrier during its return movement, means for engaging said dog, raising it and moving it into coöperative engagement with the return-screw, and means for disengaging the dog from the return-screw, substantially as described.

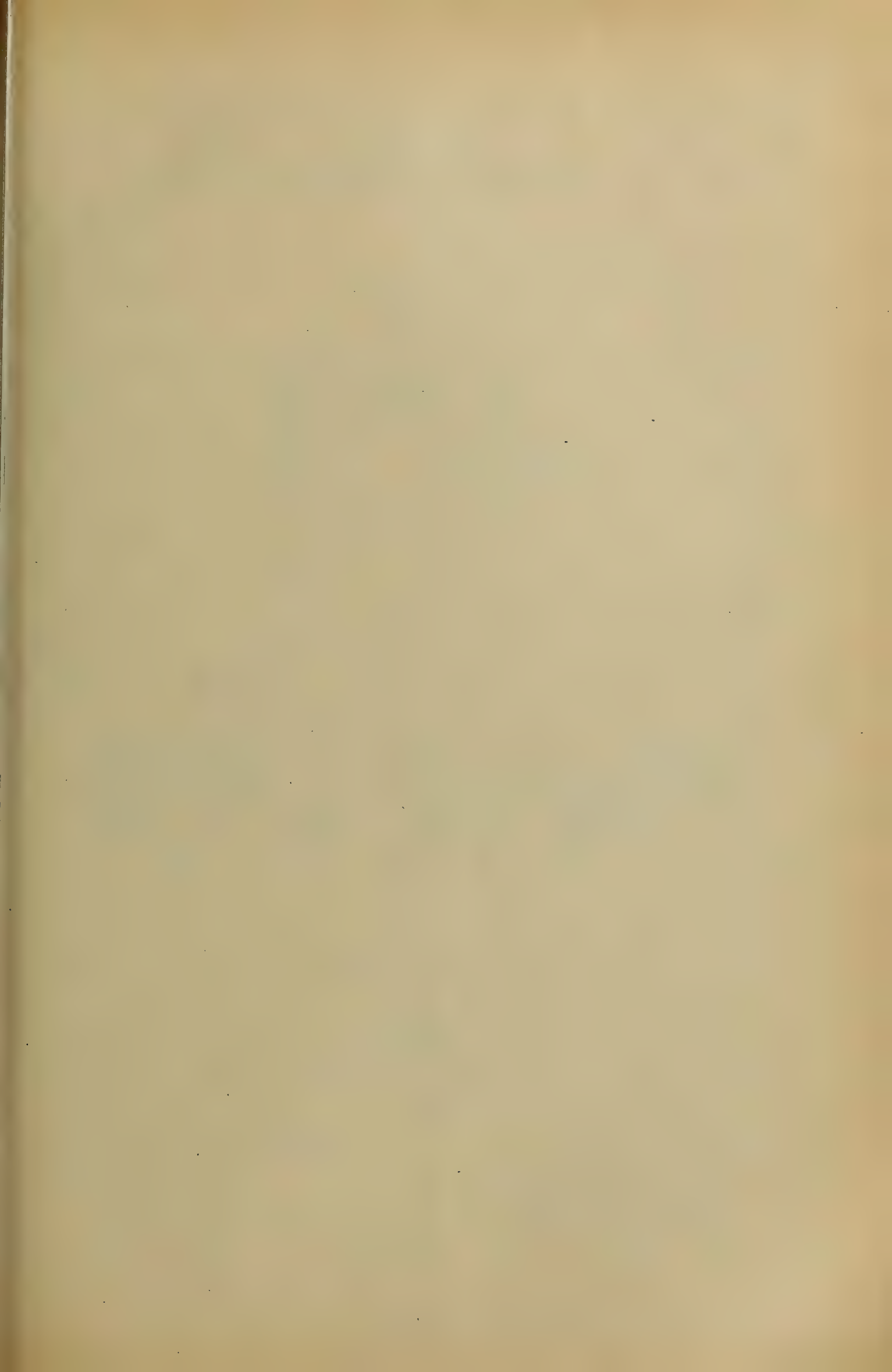
26. In a phonograph, the combination with the reproducer-carrier, feed-nut, feed-screw and a return-screw, of a dog mounted to move with the reproducer-carrier and carried by a pivot parallel to the return-screw, and adapted to engage the thread of the return-screw to impart a return movement to the reproducer-carrier and to support the reproducer-carrier during its return movement, means for engaging said dog, raising it and moving it into coöperative engagement with the return-screw, and adjustable means for disengaging the dog from the return-screw, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 4th day of June, 1903.

THOMAS F. MORRISSEY.

Witnesses:

CHARLES H. PELL,
RUSSELL M. EVERETT.



No. 831,546.

PATENTED SEPT. 25, 1906.

L. F. DOUGLASS.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED APR. 20, 1905.

Fig. 1.

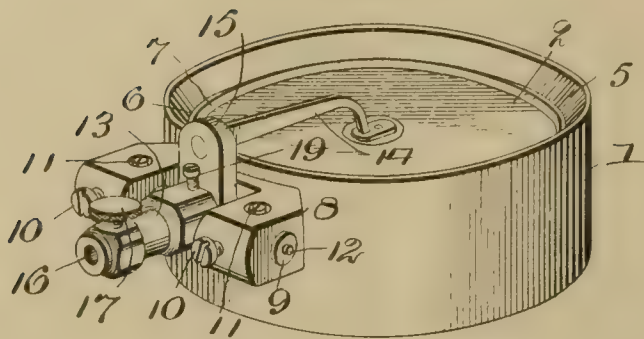


Fig. 2.

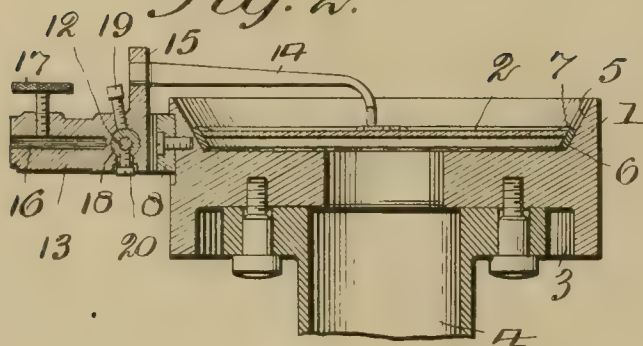


Fig. 3.

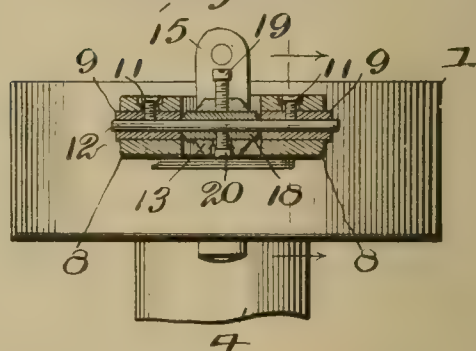
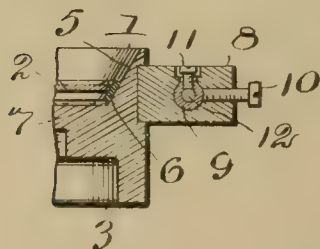


Fig. 4.



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ATTORNEY:

UNITED STATES PATENT OFFICE.

LEON F. DOUGLASS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF
NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 831,546.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed April 20, 1905. Serial No. 256,590.

To all whom it may concern:

Be it known that I, LEON F. DOUGLASS, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to produce a sound-box for a talking-machine in which the stylus-bar is more delicately, perfectly, and efficiently mounted than heretofore and also whereby the position and tension of the stylus-bar may be quickly and easily adjusted.

The further object of my invention is also to provide, in combination with the features above referred to, means for delicately mounting the diaphragm of the sound-box, so that the same may be vibrated with the most delicate and minute vibrations of the stylus-bar.

Heretofore in sound-boxes in which the stylus-bar has been mounted upon a torsional device for giving a tension thereto or for holding said stylus-bar in position the torsional device or spring has been attached rigidly to the casing of the sound-box and to the stylus-bar—that is to say, no means have been provided for the axial adjustment of the stylus-bar so that its pressure or tension in relation to the diaphragm may be varied. Furthermore, heretofore when the diaphragm has been mounted between a pair of gaskets which contact with the marginal portions of the diaphragm said diaphragm is more or less confined by the surfaces of the gaskets and its free vibration to some extent hindered. This feature when taken in connection with the lack of adjustability of the torsional mounting for the stylus-bar is a disadvantage which reduces the efficiency and quality of the reproduction by the sound-box.

Briefly, my invention comprises the embodiment in a sound-box of an improved torsional mounting and also a mounting which may be easily adjusted by means of suitable clamping or holding devices both in relation to the stylus-bar or in relation to the bearings for the torsional device.

My invention also comprises the combination, with the above features, of a diaphragm which is mounted so as to vibrate freely in response to the most minute and delicate vibrations of the stylus-bar.

For a full, clear, and exact description of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a perspective view of my improved sound-box; Fig. 2, a transverse sectional view thereof, taken substantially on a line passing longitudinally through the center of the stylus-bar. Fig. 3 is a side elevation thereof, showing the device for torsionally mounting the stylus-bar in cross-section; and Fig. 4 is a view taken substantially upon the line 4 4, Fig. 3, showing a portion of the casing of the sound-box.

Referring to the drawings, the numeral 1 indicates the usual cylindrical casing or ring in which the diaphragm 2 is mounted, said ring being provided with a transverse partition or back 3, to which is attached the sound-conducting tube 4 in any suitable or well-known manner. Within the ring 1 is provided a tapering or conical surface 5, upon which is placed a corresponding gasket 6, of rubber or other suitable elastic material. The diaphragm 2 is retained in position with its extreme outer edge resting against the inner surface of the gasket 6, said means for retaining the diaphragm in position consisting of any well-known expedient, such as wax or other cement 7, springs, or even the pressure of the stylus-bar of itself against the diaphragm.

As means for mounting the stylus-bar I provide the following parts: Attached to one portion of the periphery of the ring 1 is a U-shaped block 8, the arms of which are provided with apertures in alinement, within which are placed bushings of steel or other suitable material, as indicated at 9. These bushings 9 are adapted to be retained in position within the holes in the block 8 by means of suitable set-screws, as indicated at 10. The bushings 9 are provided with holes through which pass the small screws 11, which are adapted to contact with the torsional pin, wire, or spring 12, upon which the stylus-bar is carried, suitable openings being provided in the block 8 to allow free passage of the screws 11.

The stylus-bar consists of two main parts, a portion 13 of which is adapted to receive the stylus-needle and the portion 14 of which

connects with the first-named portion and is also operatively connected with the diaphragm 2. The portion 13 is preferably made in the form of an L-shaped block, to one arm 15 of which is attached the portion 14, the other arm of which is preferably cylindrical and provided with a stylus-socket 16 and thumb-screw 17. Adjacent the apex of the angle of the L-shaped portion 13 of the stylus-bar is provided a transverse hole, within which is placed a bushing 18, similar to the bushings 9 previously referred to. The set-screw 19 is provided for holding the bushing 18 in position within the section 13. The bushing 18 is also provided with a screw-threaded hole, through which passes the screw 20, a suitable opening being made in the section 13 to allow free passage of the screw 20. This screw 20 is adapted to engage and hold the torsional wire or spring 18 firmly in position in relation to the stylus-bar and the bushings 18.

When the parts above described are assembled, the same will be substantially in the positions indicated in Fig. 3—that is, the bushings 9 and 18 will be securely held within their respective openings by screws 10 and 19, while the torsional spring or wire 12 will be held securely within said bushings by screws 20 and 11.

By virtue of the above-described construction the stylus-bar may be adjusted both rotatably and longitudinally on the wire spring 12, and, further, the said spring may be adjusted both rotatably and longitudinally with reference to its clamping-screws. When the proper adjustment is obtained, the wire spring will be clamped to resist torsional movement by the screws 11 11; but the intermediate portion upon which the stylus-bar is mounted will cause the vibrations of the latter to be very sensitive. The wire spring 12 during its torsional movement, caused by the vibrations of the stylus-bar, has a tendency to flex away from the line of its axis; but this tendency is resisted by having bushings incasing the same throughout its entire length.

It is not necessary that I should utilize a diaphragm mounted in the manner above described, as my efficient mounting of the stylus-bar can be adapted to any vibrating diaphragm; neither do I wish to limit myself to the exact details of construction herein set forth, as I may utilize any of the well-known equivalents thereof, provided the same are within the scope of my invention as pointed out in the appended claims.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a sound-box, a stylus-bar, a torsional spring passing therethrough and adjustably retained in connection therewith, and means for supporting the outer ends of said torsional spring.

2. In a sound-box, a stylus-bar, a torsional spring, which is rotatably adjustable in relation to said stylus-bar and bearings for said torsional spring within which said torsional spring is also rotatably adjustable.

3. In a sound-box, a stylus-bar, an axle passing through said stylus-bar, fixed bearings for said axle, and bushings interposed between said axle and said stylus-bar and said bearings.

4. In a sound-box, a stylus-bar, a torsional spring passing through said stylus-bar, fixed bearings for said spring and bushings interposed between said torsional spring and said stylus-bar and bearings.

5. In a sound-box, a stylus-bar, a torsional spring passing through said stylus-bar, fixed bearings for said spring and bushings interposed between said stylus-bar and spring and between said bearings and said spring and inclosing said spring for its entire length.

6. In a sound-box, a stylus-bar, an axle passing through said stylus-bar, fixed bearings for said axle, and bushings interposed between said stylus-bar and axle, and between said bearings and said axle and inclosing said axle for its entire length.

7. In a sound-box, a stylus-bar, an axle passing through said stylus-bar, a bushing interposed between said stylus-bar and axle, fixed bearings for said axle, bushings interposed between said bearings and axle, and means for clamping said bushings to said axle and means for clamping said bushings within said bearings and within said stylus-bar.

8. In a sound-box, the combination with the stylus-bar, of a cylindrical torsional spring, said spring being rotatably adjustable for varying the tension of said stylus-bar, and a diaphragm cooperating with said stylus-bar and mounted by its peripheral edge only.

9. In a sound-box, the combination with a stylus-bar, of a cylindrical torsional spring passing therethrough, bearings for said spring, bushings interposed between said spring and bearings, and bushings interposed between said spring and stylus-bar, means for holding said bushings rigidly in position, means for holding said torsional spring adjustably in position within said bushings, and a diaphragm cooperating with said stylus-bar and mounted by its peripheral edge only.

10. In a sound-box, the combination with the stylus-bar, of a cylindrical torsional spring, said spring being rotatably adjustable for varying the tension of said stylus-bar and a diaphragm cooperating with said stylus-bar.

11. In a sound-box, the combination with a stylus-bar, of a cylindrical torsional spring passing therethrough, bearings for said spring, bushings interposed between said

spring and bearings, and a bushing interposed between said spring and stylus-bar, means for holding said bushings rigidly in position, means for holding said torsional spring adjustably in position within said bushings, and a diaphragm cooperating with said stylus-bar.

12. In a sound-box, the combination with a stylus-bar of a rotatably-adjustable torsional spring connected therewith, and a diaphragm cooperating with said stylus-bar.

13. In a sound-box, a stylus-bar, a torsional spring passing therethrough, and rotatably and longitudinally adjustable therein, and means arranged on each side of the stylus-bar for resisting the torsion of said spring.

14. In a sound-box, a stylus-bar, a torsional spring on which said stylus-bar is mounted, and means arranged on each side of the stylus-bar for resisting the torsion of said spring.

15. In a sound-box, a stylus-bar, a torsional spring passing therethrough and rotatably and longitudinally adjustable therein, and means arranged on each side of the stylus-bar for supporting said spring.

16. In a sound-box, a stylus-bar, a torsional spring passing therethrough, the said stylus-bar being rotatably and longitudinally adjustable on said spring, and means located on each side of the stylus-bar for supporting said spring.

17. In a sound-box, a stylus-bar, a torsional spring passing therethrough and rotatably and longitudinally adjustable therein, means arranged on each side of the stylus-bar to support said spring, and means for rotatably and longitudinally adjusting the same.

18. In a sound-box, a stylus-bar, a torsional spring passing therethrough and longitudinally adjustable therein, and means arranged on each side of the stylus-bar for resisting the torsion of said spring.

19. In a sound-box, a stylus-bar, a torsional spring passing therethrough and longitudinally adjustable therein, and means arranged on each side of the stylus-bar for supporting said spring.

20. In a sound-box, a stylus-bar, a torsional spring passing therethrough, the said stylus-bar being longitudinally adjustable on said spring, and means located on each side of the stylus-bar for supporting said spring.

21. In a sound-box, a stylus-bar, a torsional spring passing therethrough and longitudinally adjustable therein, means arranged on each side of the stylus-bar to support said spring, and means for longitudinally adjusting the same.

22. In a sound-box, a stylus-bar, a torsional spring upon which said stylus-bar is mounted, and means for maintaining the axis of said spring in a straight line during its torsional movement.

23. In a sound-box, a stylus-bar, a torsional spring upon which said stylus-bar is mounted, and means for preventing the spring from bending or flexing out of its alinement during its torsional movement.

24. In a sound-box, a stylus-bar, a torsional spring upon which said stylus-bar is mounted, means arranged on each side of said stylus-bar for resisting the torsion of said spring and means for maintaining the torsional portion of said spring in straight alinement.

25. In a sound-box, a torsional spring, a stylus-bar mounted thereon, and means for incasing the said spring throughout its entire length.

26. In a sound-box, a wire spring having a stylus-bar mounted thereon, and a U-shaped block containing alined apertures in its arms, in which the extremities of said wire are supported.

27. In a sound-box, a torsional spring, a stylus-bar rotatably mounted thereon, supporting-arms having alined apertures therein, bushings within said apertures, and means arranged within the bushings for resisting the torsion of said spring.

28. In a sound-box, a torsional spring, supporting-arms having alined apertures therein, a stylus-bar arranged between said arms and having an aperture alined with those of the supporting-arms and a bushing within each aperture, the said spring being supported within said bushings, the said bushings being in contact with each other to incase the said spring throughout its entire length.

In witness whereof I have hereunto set my hand this 29th day of March, A. D. 1905.

LEON F. DOUGLASS.

Witnesses:

OLIVER JONES,
ALEXANDER PARK.

No. 831,606.

PATENTED SEPT, 25, 1906.

T. A. EDISON.
SOUND RECORDING APPARATUS.
APPLICATION FILED NOV. 8, 1901.

4 SHEETS—SHEET 1.

Fig. 1

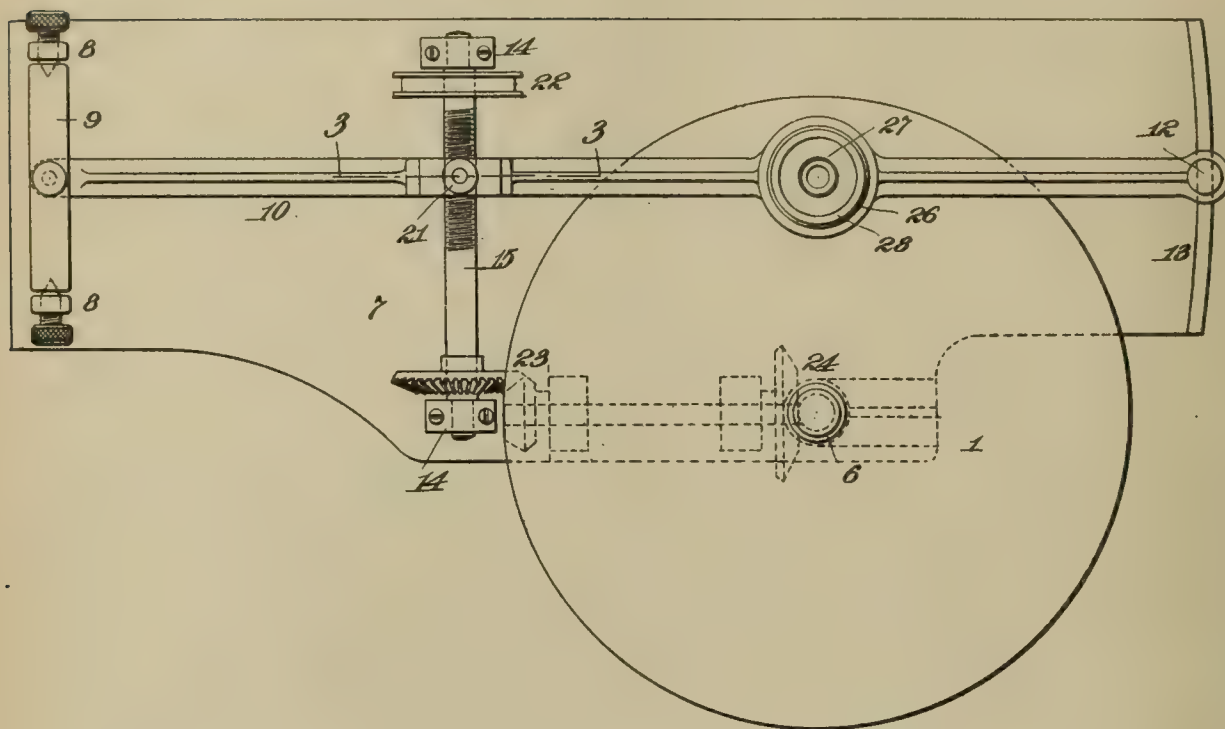
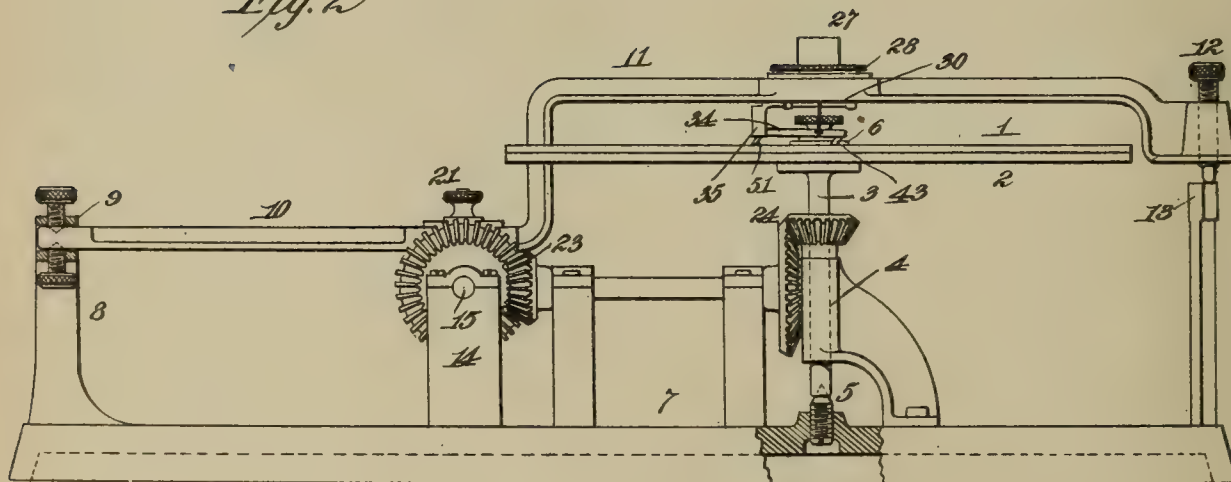


Fig. 2

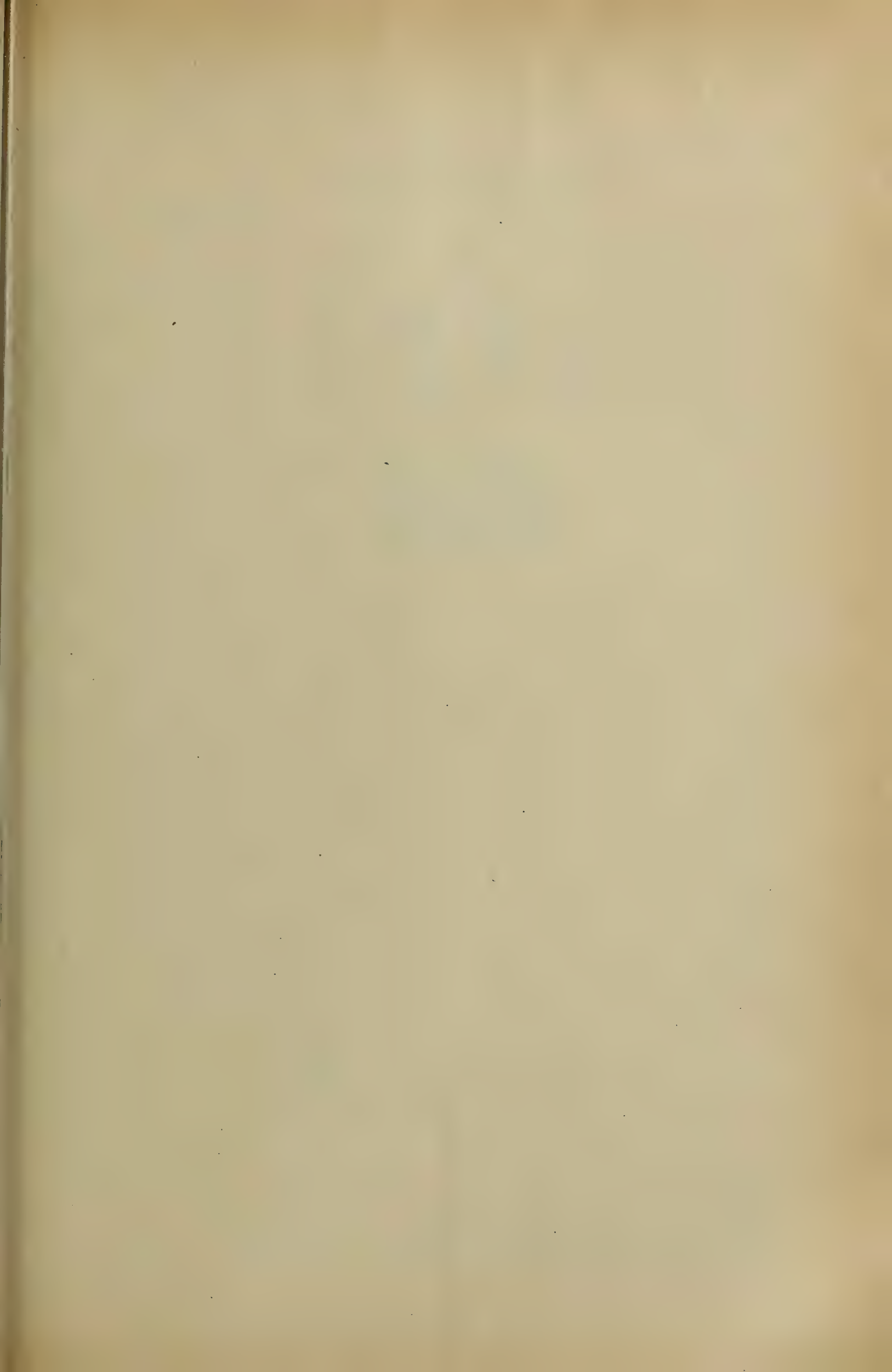


Witnesses:

Geo. F. Coleman
Wm. Robt. Taylor

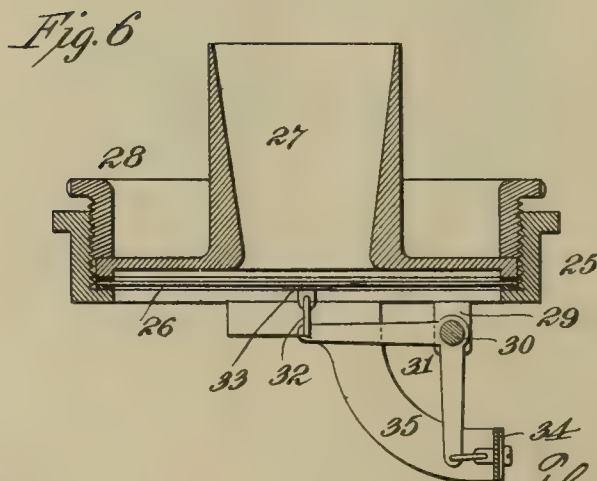
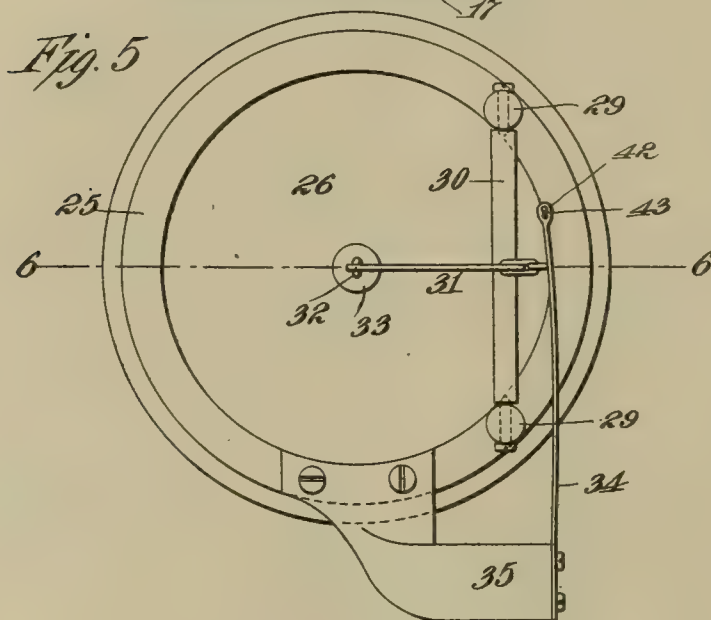
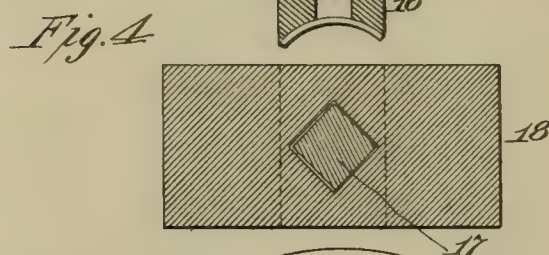
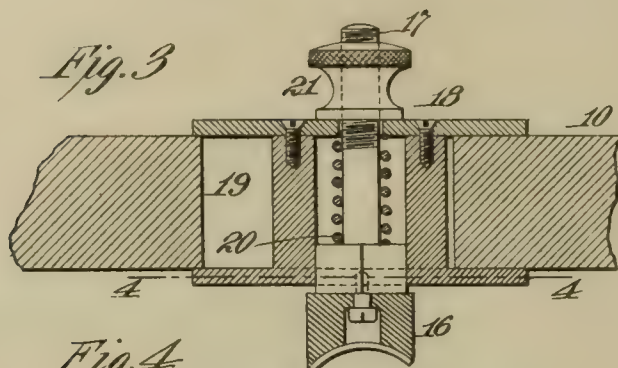
Inventor

Thomas A. Edison
by L. J. Edwards & Son
Attorneys



T. A. EDISON.
SOUND RECORDING APPARATUS.
APPLICATION FILED NOV. 8, 1901.

4 SHEETS—SHEET 2.

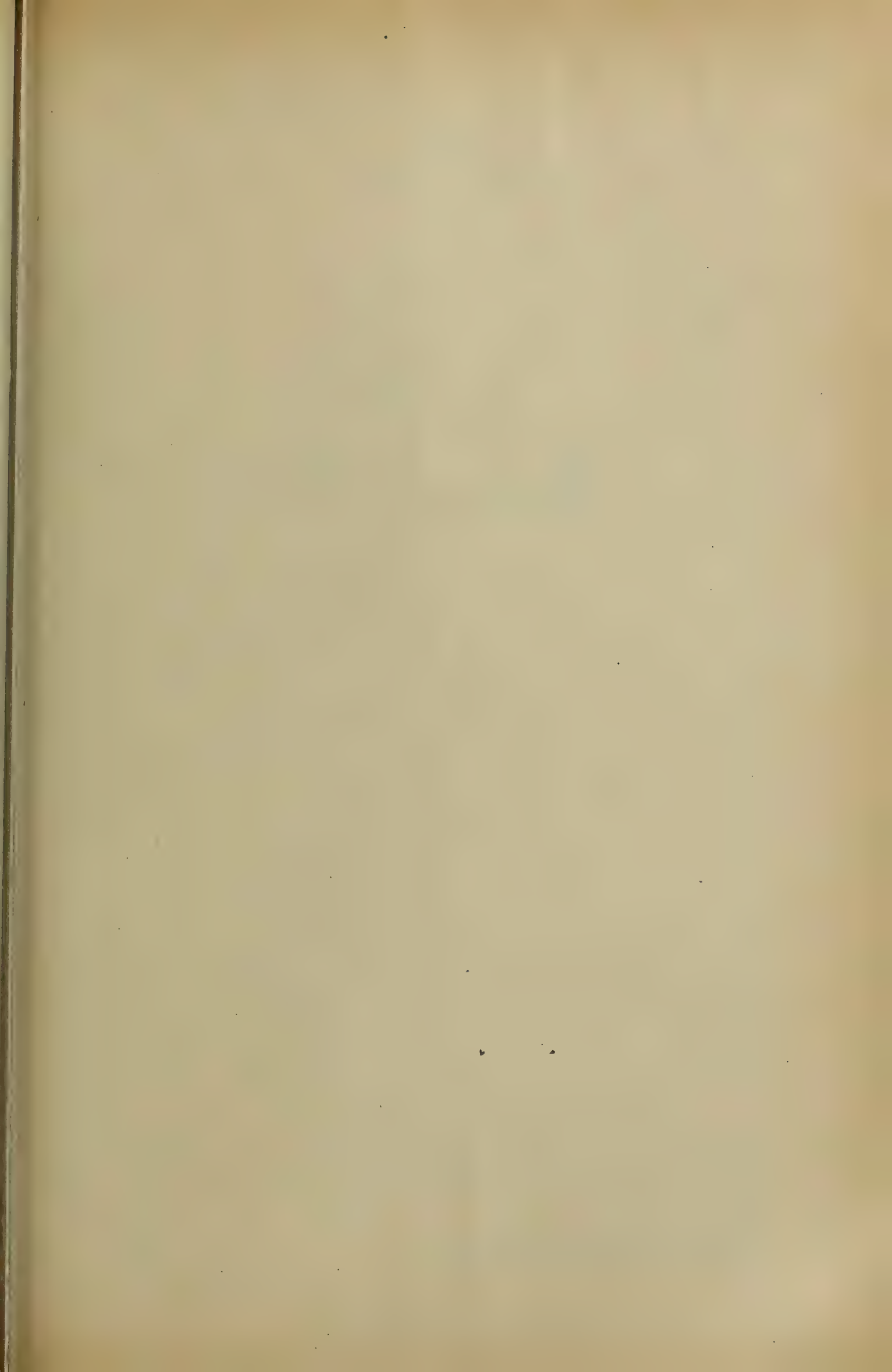


Witnesses:

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Geo. Robt. Taylor

Inventor

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No. 831,606.

PATENTED SEPT. 25, 1906.

T. A. EDISON.
SOUND RECORDING APPARATUS.
APPLICATION FILED NOV. 8, 1901.

4 SHEETS—SHEET 3.

Fig. 7

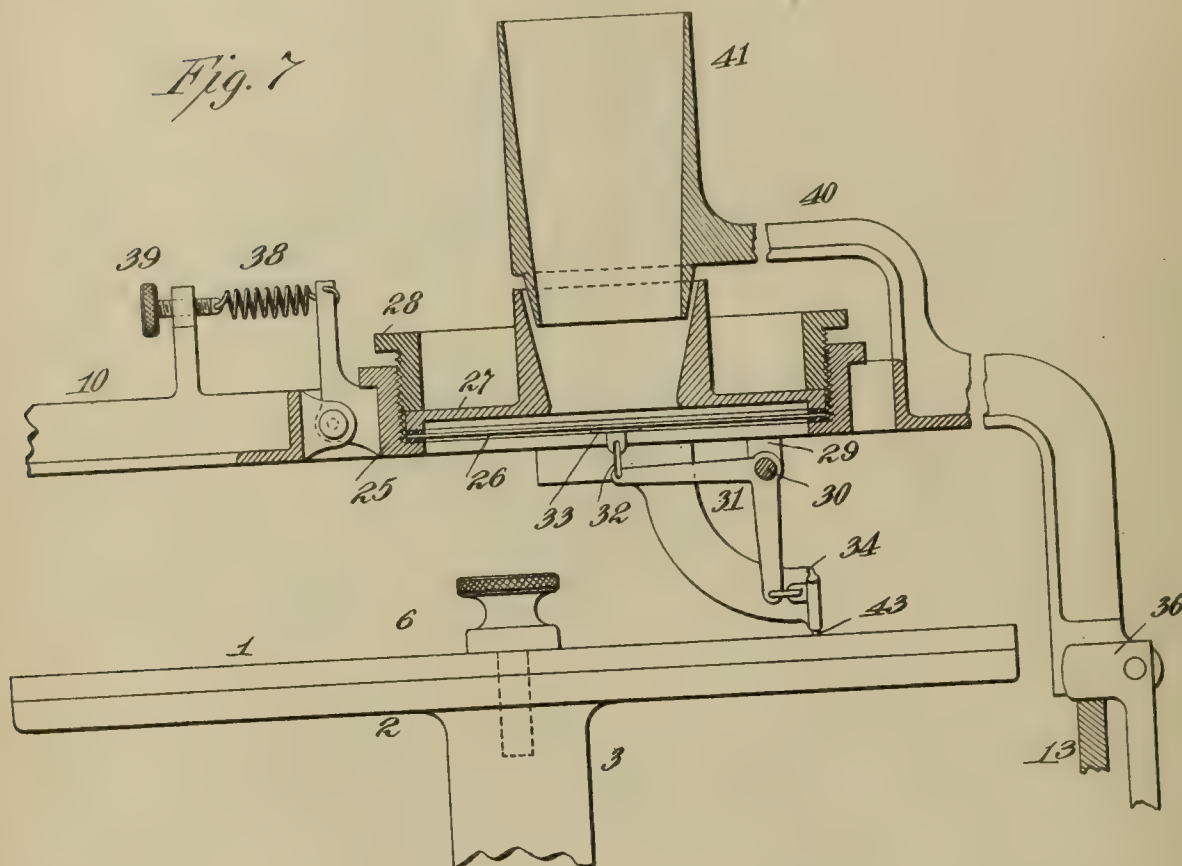
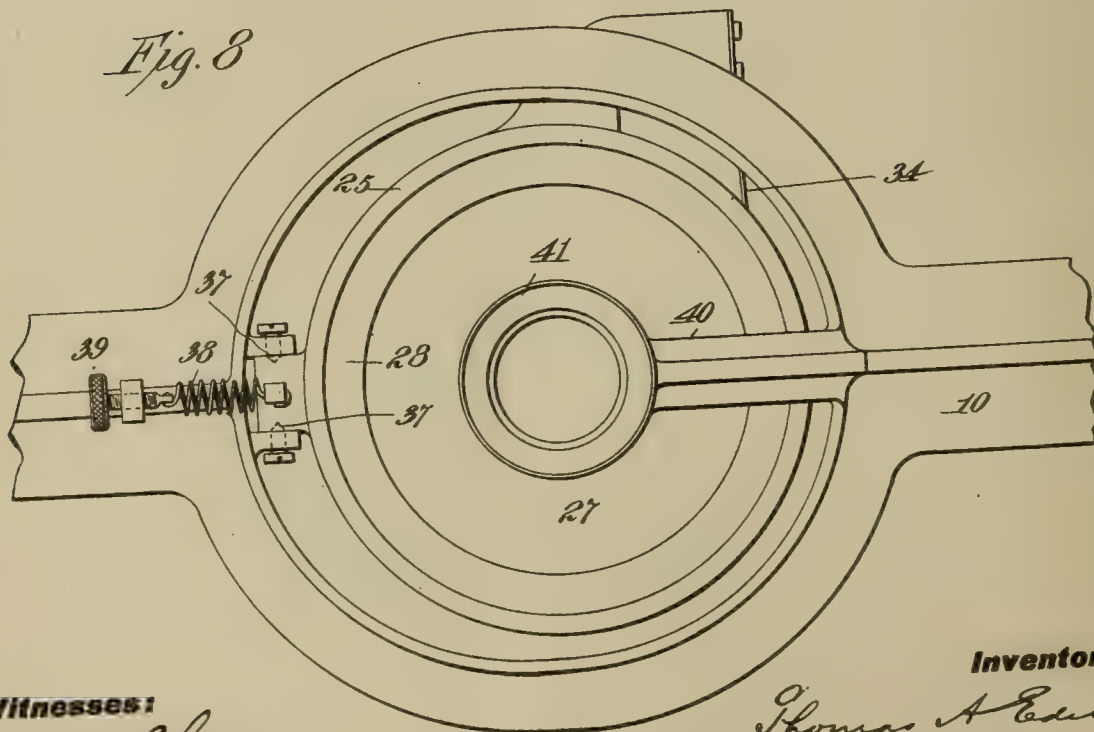


Fig. 8



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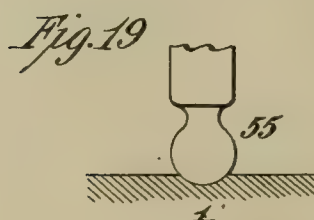
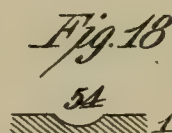
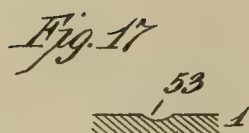
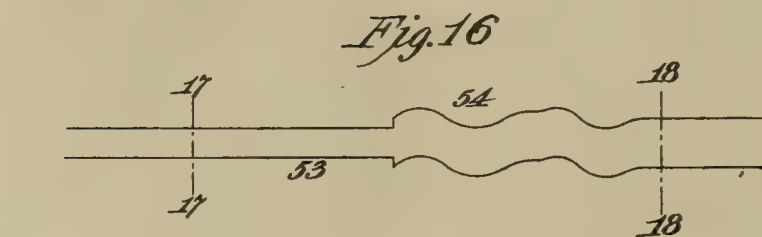
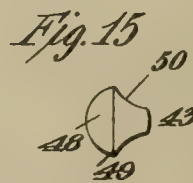
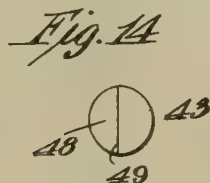
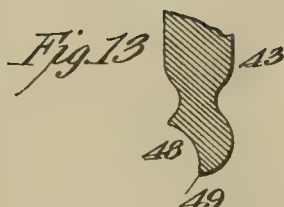
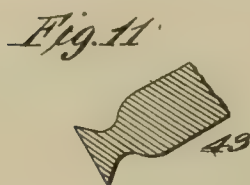
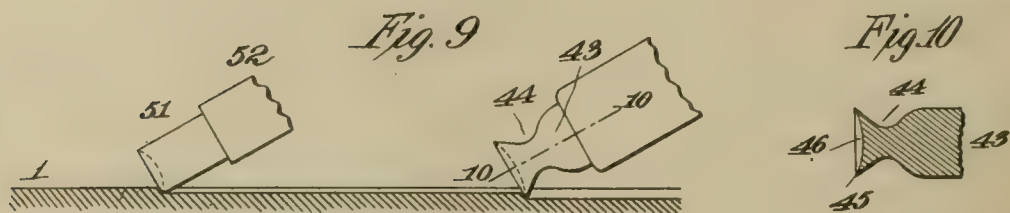
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T. A. EDISON.
SOUND RECORDING APPARATUS.
APPLICATION FILED NOV. 8, 1901.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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CORPORATION OF NEW JERSEY.

SOUND-RECORDING APPARATUS.

No. 831,606.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed November 8, 1901. Serial No. 81,534.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, Essex county, State of New Jersey, have invented a certain new and useful Improvement in Sound-Recording Apparatus, of which the following is a description.

My invention relates to improved sound-recording apparatus of the type wherein a graphic sound-record is produced on a disk-like or cylindrical blank and which is formed of a sinuous groove of substantially uniform depth and width as distinguished from my phonograph wherein these dimensions of the record-groove are not uniform.

Sound-records of the kind to which my present invention relates are relatively simple in character, and the matter of duplicating them does not present the difficulties of duplicating phonographic records.

Prior to my invention in the making of sound-records on a disk blank—for example, in the form of a sinuous groove of substantially uniform depth and width—a suitable plate or foundation was covered with a thin layer or film of wax-like material, which was engaged by a needle-like recording-stylus connected to the diaphragm, the arrangement being such that in the absence of vibrations the stylus removed the film of wax-like material to its full depth to disclose the foundation and in the form of a spiral groove of uniform width. By vibrating the diaphragm the said groove was caused to partake of sinuosities and undulations corresponding graphically to the sound-waves. By suitable etching, electroplating, photographic, or allied processes a matrix was secured from the master so formed and used for the production of duplicates by various methods. The processes used prior to my invention for the making of these records were objectionable for many reasons, and especially because the records produced are not accurately representative of the sound-vibrations, first, because the recording-stylus, in order that it may certainly cut through the depth of the wax-like material, must be engaged with considerable friction against the foundation on which the wax is carried, thereby offering unnecessary resistance to the vibration of the

stylus, and, second, because the stylus, being unprovided with cutting edges, in its vibrations merely displaced or compressed the wax-like material in the formation of the groove, instead of cleanly cutting it.

The object of my invention is to provide improvements in the art of making records of this kind in the apparatus involved and by which the resulting records will be more perfect and capable of more accurate reproduction than records of the kind as heretofore made.

The invention in its preferred form resides in the utilization of means coöperating with the recorder for causing the latter to always cut to the desired depth in the wax-like material irrespective of variations in the thickness of the blank or other eccentricities in the plane of the recording-surface. This feature of the invention is carried into effect by engaging the recorder to the desired depth in the recording material by gravity and mounting the recorder so that it is free to rise and fall to accommodate itself to any changes in the plane of the recording-surface.

My invention comprises also such other features as are hereinafter set forth and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of the complete apparatus for operating on a disk-like blank and showing the recording-stylus as being mechanically adjustable with respect to the blank; Fig. 2, a side elevation of the same; Fig. 3, a section on the line 3 3 of Fig. 1; Fig. 4, a section on the line 4 4 of Fig. 3; Fig. 5, a bottom view of the recorder proper in its preferred form; Fig. 6, a longitudinal section on the line 6 6 of Fig. 5; Fig. 7, a longitudinal section through the swinging arm, illustrating an embodiment of that feature of the invention by which the recorder will engage the blank by gravity so as to cut to the desired depth irrespective of mechanical variations in the blank; Fig. 8, a plan view of the same; Fig. 9, a greatly-enlarged view showing the blank in section, also the preferred form of recording-stylus in operative position and on the same scale, a grooving-tool preced-

ing the same; Fig. 10, a section on the line 10 10 of Fig. 9, showing the side cutting edges of the preferred recording-stylus; Fig. 11, a sectional view of a modification of the stylus; Fig. 12, a corresponding view of a further modification thereof; Fig. 13, a view corresponding to Fig. 11, showing a further modification of the recording-stylus; Fig. 14, a bottom view of the stylus shown in Fig. 13; Fig. 15, a corresponding view illustrating a slight modification of the stylus shown in Figs. 13 and 14; Fig. 16, a greatly-enlarged view of the record-groove formed with a cutting-edged recording-stylus of the improved type, showing also the smaller non-sinuous groove; Fig. 17, a section on the line 17 17 of Fig. 16; Fig. 18, a section on the line 18 18 of Fig. 16, and Fig. 19 an enlarged cross-sectional view illustrating the engagement with the record-groove of a spherical reproducer.

In all of the above views corresponding parts are represented by the same numerals of reference.

A suitable blank 1, made, preferably, of the ordinary photographic wax-like composition, in the form of a relatively thin disk (say one-quarter inch in thickness) is carried on a rotating support 2 from a shaft 3, the latter being mounted in a bearing 4 and stepped at its bottom on a cone-pivot 5. The blank 1 is held in place on the support 2 in any suitable way, as by means of a disk 6, screwed in place. It will be understood, of course, that when the blank is cylindrical in form it may be received on a tapered mandrel, as in an ordinary phonograph. The bearings 4 and 5 are suitably carried by a frame 7, which extends rearwardly and is formed with bearings 8 8, in which is supported a rock-shaft 9, to which an arm 10 is pivoted, whereby the latter may partake of universal movement, as will be obvious. The arm 10 is preferably arched at 11, where it passes over the blank 1, and at its forward end is supported by an adjustable screw 12 on a suitable track or guide 13. The adjusting-screw 12 permits the arm 10 to be adjusted with respect to the surface of the blank 1 in order that the required depth of cut of the recording-stylus may be secured, as will be explained. Mounted in suitable bearings 14, extending up from the frame 7, is a feed-screw 15, which is engaged by a nut 16 and by means of which the arm 10 will be swung on its pivot to carry the recorder radially across the face of the blank 1 in order to form the spiral record-groove. The nut 16 is pivoted to a shank 17, which latter is vertically movable within a two-part block 18, arranged to slide in an opening 19 in the arm 10. Mounted within the block 18 is a spring 20, tending to force the nut 16 downwardly. Extreme movement of the shank 17 is limited by a nut 21. By this construction it will be observed that the arm 10 is free to move pivotally without disengaging

the nut 16 from the feed-screw 15, and the arm can be adjusted vertically with respect to the blank 1 without affecting the engagement between said nut and feed-screw. When, however, it is desired to remove the completed record or to put a new blank in place, the arm 10 is swung upward pivotally to disengage the nut 16 from the feed-screw, and thereby completely disclose the support 2. In the drawings I illustrate a band-wheel 22 for rotating the feed-screw 15, and I show bevel-gearing 23 and 24 for transmitting motion from said feed-screw to the shaft 3. The band-wheel 22 is driven from a spring, electric, or other motor.

The arm 10 carries the diaphragm and intermediate connections between the same and the recording-stylus, the preferred construction of which parts is shown in Figs. 5 and 6. An internally-threaded ring 25 carries a diaphragm 26, held in place between rubber gaskets, as shown, and also the disk 27, to which the speaking tube or horn is connected, said disk being held in position by a clamping-ring 28. Mounted in bearings 29 on the under side of the ring 25 is a light rock-shaft 30, carrying a very light and rigid bell-crank lever 31. The free end of the horizontal arm of this lever is connected by a link 32 to a disk 33, which is cemented to the under side of the diaphragm 26, while the free end of the vertical arm of said lever is connected by a link to a spring 34, mounted on an arm 35, secured to the under side of the ring 25. The free or forward end of the spring 34 inclines slightly from the horizontal and toward the blank 1. In use the spring 34 is maintained normally under tension, so that as the diaphragm moves downward the elasticity of the spring moves it toward its unflexed position, while a reverse movement of the diaphragm increases the tension on said spring. In this way it will be seen the tension of the spring keeps the connections between it and the diaphragm always under stress, so that there can be no lost motion, and the spring will be caused to respond accurately to the vibrations.

With the form of device shown in Figs. 1 and 2 the recorder as a whole is carried directly within an eye or opening in the arm 10, so that by means of the adjusting-screw 12 the recording-stylus can be adjusted with respect to the blank so as to cut therein to the desired depth. As explained, such an adjustment does not affect the engagement between the nut 16 and the feed-screw. When the recording-surface of the blank is perfectly accurate, a mechanical adjustment of the recording-stylus with respect to the recording-surface is satisfactory; but under ordinary conditions blanks of wax-like material, particularly when in the form of disks of considerable diameter, become warped or otherwise made eccentric, so that the record-

ing-surfaces do not lie in a perfect plane. With such blanks, therefore, it would be difficult to make use of a mechanical adjustment which would cause the recording-stylus to cut always to the required depth. I therefore prefer to so mount the recording-stylus in the apparatus that it will engage the blank by gravity, cutting to the required depth therein and raising or falling to accommodate itself to any mechanical variations in the record-surface. This might be done in any well-known way—as, for example, by pivoting the recorder as a whole so as to permit the recording-stylus to rest on the blank or to interpose between the diaphragm and the recording-stylus a compensating weight, which without affecting the connection between the diaphragm and stylus presses the latter to the required depth in the recording material. I illustrate a compensating mechanism of the latter type in Letters Patent No. 705,829, granted July 29, 1902, and wherein I describe and claim a new reproducing apparatus for use in connection with the records made by the present machine, while an apparatus of the former type is shown in Figs. 7 and 8 of the accompanying drawings. With this arrangement the adjusting-screw 12 may be dispensed with and the arm 10 provided at its forward end, with the usual cam 36 for elevating and depressing it. Said arm is provided centrally with an enlarged opening or eye in which the recorder is mounted on pivots 37, so that the recorder will be free to swing thereon. A spring 38 is employed for sufficiently counteracting the weight of the parts to permit the recording-stylus to track to the desired depth in the blank, and the tension of said spring is adjusted by a screw 39. An arm 40 carries the speaking-tube 41; so that the latter will be independent of the recorder, which will therefore be free to rise and fall with any variations in the blank, compelling the recording-stylus, therefore, to always track to the desired depth in the material. The spring 34 carries the recording stylus or tool. The preferred form of tool or stylus is shown in Figs. 9 and 10, which are generally enlarged. The free end of the spring 34 carries a suitable socket 42, which receives the stylus 43. The latter is formed of cylindrical material, either steel or the ordinary sapphire, and is cut away at the neck 44 to form a sharp cutting edge 45. The extreme outer end of the stylus is slightly concaved at 46, as with ordinary phonographic recorders. The essential feature of the improved stylus is that it presents the thin cutting edge 45, which in the formation of the sinuous groove, as will be explained, performs a true cutting operation, instead of merely displacing or compressing the material, as is the case with a recording-stylus unprovided with cutting edges. The stylus 43, as shown, is arranged so that its main portion

behind the neck 44 will not interfere with the material and is ordinarily placed almost horizontally, as shown.

In Fig. 11 the recording-stylus is constructed exactly as that of Figs. 9 and 10, except that the concavity 46 is omitted.

In Fig. 12 a further modification of the stylus is shown, differing from that illustrated in Fig. 11 in being provided with a conical extension 47 beyond the cutting edge 45. This form of cutter does not present so sharp a cutting edge as the forms previously described, but is somewhat more durable than such forms.

With the recording-stylus shown in Figs. 13 and 14 I make the device spherical in shape and cut away one side, as shown at 48, so that the angle 49 will effect the cutting operation. If desired, the sides of the cutter shown in Fig. 13 may be removed at 50, Fig. 15, behind the cutting edge, so as to reduce the thickness of the cutting edge at the sides and enable it to perform a more efficient cutting action. In some instances I may make use of a grooving-tool 51, (see Figs. 2 and 9,) supported in a socket 52, secured to the bottom of the ring 25 and which tracks in the recording material in advance of the stylus. The grooving-tool 51 is preferably made like an ordinary phonographic recorder, but of less diameter, being generally cylindrical in form with a concaved end to form a sharp cutting edge. This grooving-tool, as shown in Figs. 16 and 17, cuts a relatively shallow and narrow groove 53, so as to thereby remove a part of the material from the path and in advance of the recording-stylus, and therefore minimize the work which the latter device is required to perform. Thus, having reference to Fig. 16, it will be seen that the record-groove 54, which is cut in the recording composition by the stylus, amounts practically to an enlarging and deepening of the groove 53. This record-groove presents in cross-section at all portions of its length an arc of a circle and is of substantially uniform depth and width throughout. It is characteristically different from records formed with needle-like recorders used before my invention in being smoothly cut throughout instead of resulting from the crowding or displacing of the material with the inherent disadvantages incident to the latter operation, as I have before described.

Having formed a sinuous groove with curved sides and bottom, I am enabled to make use of a spherical reproducer 55, (see Fig. 19,) which engages the groove and accurately tracks it throughout its entire portion. If, however, the record is formed at a relatively slow speed or if the sounds which are recorded are of high pitch or great volume, so that the waves of which the record is composed are closely crowded together, I may make use of a reproducing device of the type

described in my Reissue Patent No. 11,857, dated September 25, 1900, and wherein the longitudinal axis of the bearing-surface is materially less than the transverse axis. By making use of a reproducer having a curved bearing-surface I reduce wear thereon to a minimum, and therefore do away with the necessity of employing a new reproducer after a comparatively few reproductions have been secured therewith, as is now the case.

It will be understood, of course, that the records made as I have explained can be used in the first instance for securing reproductions or that such records can be employed as masters from which to make a matrix or mold for use in the manufacture of duplicate copies thereof by any ordinary and well-known electroplating, photographic, or other process.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In an apparatus of the character described, a base, a record-holder rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint and provided with a feed-nut adapted to engage said feed-screw, a diaphragm-support pivoted to said arm on a substantially horizontal axis and means for partially counterbalancing the weight of said diaphragm-support, substantially as set forth.

2. In an apparatus of the character described, a base, a record-holder rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint and provided with a feed-nut adapted to engage said feed-screw, a track carried by said base for supporting the free end of the diaphragm-supporting arm, a diaphragm-support pivoted to said arm on a substantially horizontal axis, and means for partially counterbalancing the weight of said diaphragm-support, substantially as set forth.

3. In an apparatus of the character described, the combination with a record-tablet and means for moving the same, of a pivotally-supported diaphragm, means for partially counterbalancing the weight of said diaphragm and its support, a spring maintained under normal tension, a recording stylus carried by said spring, and a pivotal connection between said spring and diaphragm, substantially as set forth.

4. In an apparatus of the character described, a supporting-base, a record-holder

rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint, and a spring-pressed feed-nut carried by said arm and engaging said feed-screw, substantially as set forth.

5. In an apparatus of the character described, a supporting-base, a record-holder rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint, and a vertically-adjustable feed-nut carried by said arm and engaging said feed-screw, substantially as set forth.

6. In an apparatus of the character described, a supporting-base, a record-holder rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint, and a vertically-adjustable spring-pressed feed-nut carried by said arm and engaging said feed-screw, substantially as set forth.

7. In an apparatus of the character described, a diaphragm-supporting arm having a longitudinally-extending opening there-through, a block movably supported in said opening, a shank extending through said block, a spring interposed between said shank and block and a feed-nut connected to said shank, substantially as set forth.

8. In an apparatus of the character described, a diaphragm-supporting arm having a longitudinally-extending opening there-through, a block movably supported in said opening, a shank extending through said block, a spring interposed between said shank and block and means for varying the pressure of said spring, substantially as set forth.

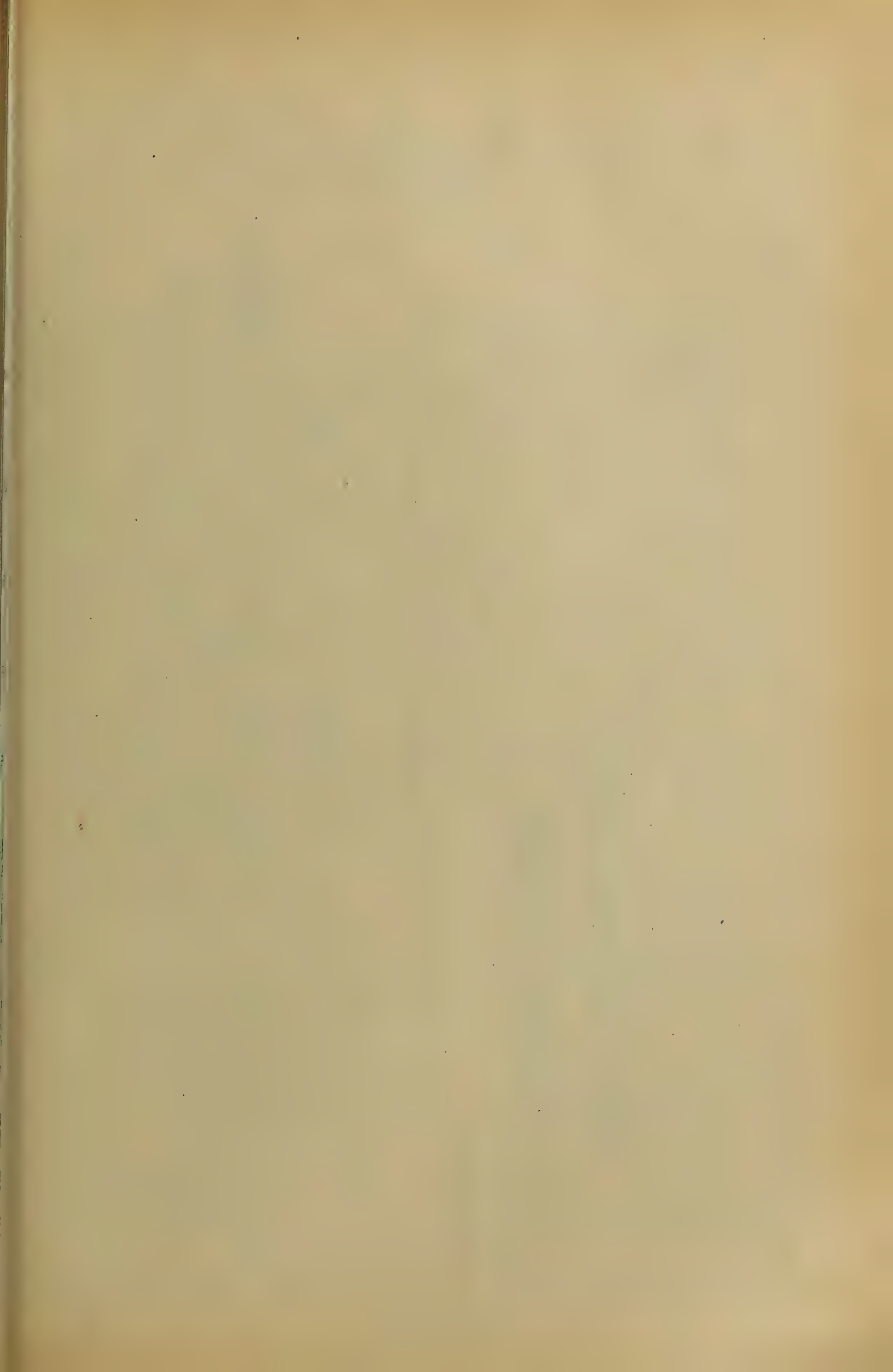
9. In an apparatus of the character described, a supporting-base, a record-holder rotatably supported thereby, a feed-screw, means for driving said record-holder and feed-screw, a diaphragm-supporting arm connected at one end to said base by a universal joint, a feed-nut carried by said arm and engaging said feed-screw and a track carried by said base for supporting the free end of said diaphragm-supporting arm, substantially as set forth.

This specification signed and witnessed this 24th day of October, 1901.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,
JNO. ROBT. TAYLOR.



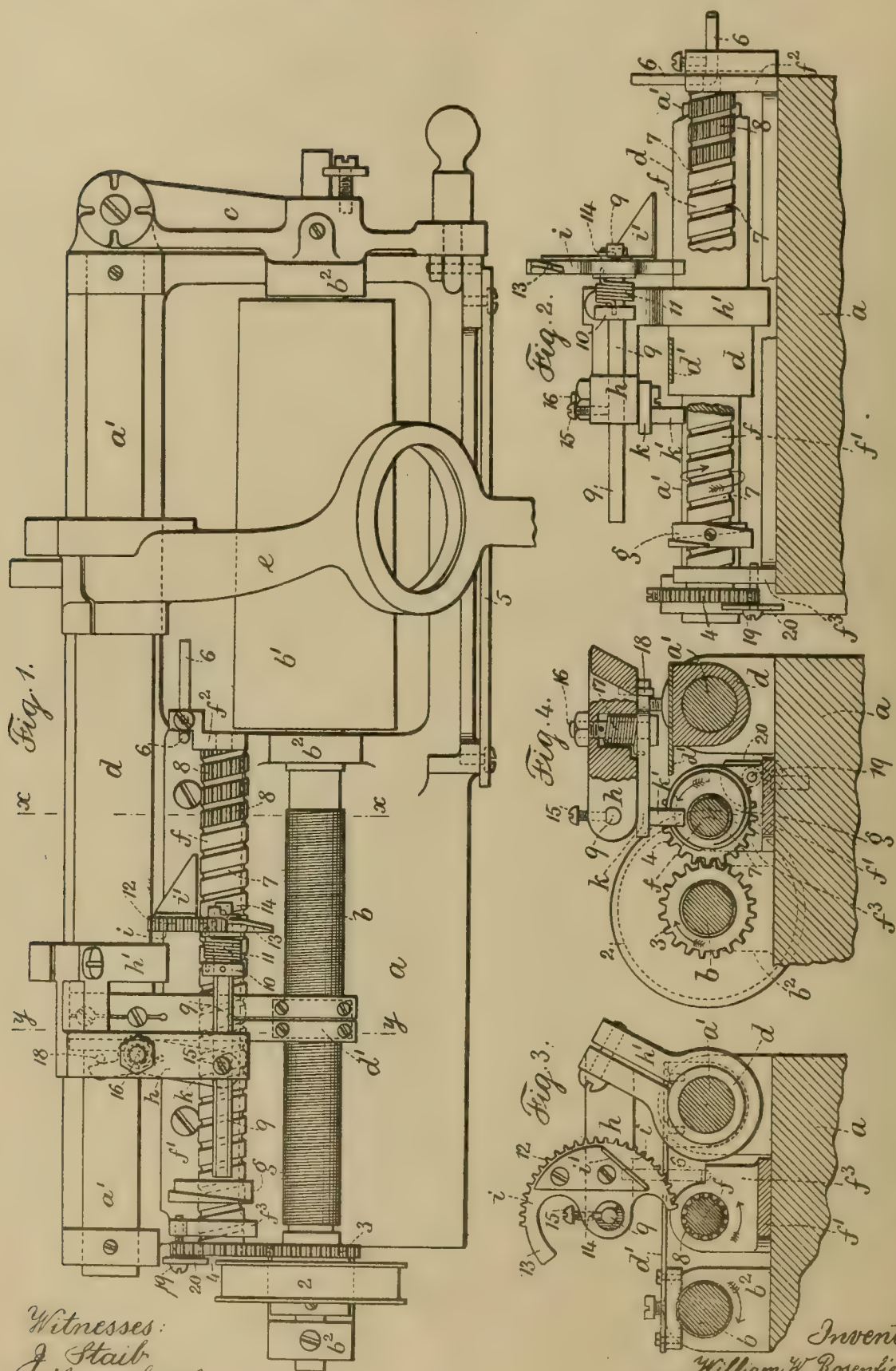
No. 831,630.

PATENTED SEPT. 25, 1906.

W. W. ROSENFELD.

PHONOGRAPH.

APPLICATION FILED JULY 23, 1903. RENEWED JULY 2, 1904.



UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 831,630.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed July 23, 1903. Renewed July 2, 1904. Serial No. 215,180.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented an Improvement in Phonographs, of which the following is a specification.

This invention relates to automatic return mechanisms for phonographs.

A full understanding of the invention can best be given by a detailed description of a preferred construction embodying the various features thereof, and such description will now be given in connection with the accompanying drawings, showing such a preferred construction.

In said drawings, Figure 1 is a plan view of a phonograph provided with automatic return mechanism embodying my invention. Fig. 2 is an elevation of the return mechanism with the auxiliary or return feed-shaft broken away, so as to more clearly show other parts. Fig. 3 is a section taken on the line $x x$ of Fig. 1 looking toward the left, and Fig. 4 is a section taken on the line $y y$ of Fig. 1 looking toward the left, parts being omitted from Fig. 3 for clearness which are shown in Fig. 4.

a represents the usual bed of a phonograph or similar machine; b , the threaded feed-shaft; b' , the mandrel, which is shown as carried by the feed-shaft; b^2 , bearings for the feed-shaft and mandrel, and 2 the driving-pulley for the feed-shaft. The back frame a' carries a sliding sleeve d of usual construction, to the right-hand end of which is secured the reproducer arm or carrier e , and 5 is a rest for the free end of the reproducer-arm for supporting the same as it makes its reproducing movement. In the drawings I have not shown the reproducer proper, but only the annular carrier adapted to receive the same. The sleeve d also carries a feed-arm d' , provided with a threaded block of usual construction to mesh with the thread of the feed-shaft b , so that in the usual manner movement is communicated from the shaft b through the feed-arm d' to the sleeve d and to the reproducer-arm e , causing the same to move longitudinally of the record on the mandrel b' . The parts above described are or may be of usual construction. c is a swinging arm of usual form.

An auxiliary shaft f , which serves as a return feed-shaft, is provided with a spiral groove or screw-thread 7 and has a portion of its surface between the convolutions of the

spiral groove at or near its right-hand end provided with teeth 8 and is mounted in bearings $f^2 f^3$ on an auxiliary bed or plate f' , adapted to rest upon and be secured to the bed a . The right-hand end of the shaft f is reduced to pass into the bearing f^2 , but the left-hand end of the shaft is of full size and passes through the bearing f^3 , and upon the end of the shaft adjacent to this latter bearing is a gear 4, meshing with a gear 3 on the feed-shaft b . To prevent the auxiliary shaft f from moving out of its bearing, the left-hand bearing f^3 is provided with a screw-stud 19, which carries a disk 20, which overlaps the gear 4 to prevent longitudinal movement of the auxiliary shaft. An eccentric cam g , having a spiral rib or shoulder, is mounted on the auxiliary shaft, so as to be adjustable longitudinally thereof, being secured in position by means of a set-screw, as shown in Fig. 2. Fig. 4 shows the eccentric shape of the cam, and Figs. 1 and 2 show the spiral form thereof.

A bracket h is secured to the sleeve d , as by means of an arm h' , split and clamped to the sleeve by means of a screw, as shown in Fig. 3. The bracket h carries a bar 9, having a flat face, said bar extending through an opening in the bracket and parallel with the auxiliary shaft f , being adjustable lengthwise and secured in any desired position of its lengthwise adjustment by means of a screw 15. An eccentric segment i is rotatably mounted on the right-hand end of the bar 9, its rotary movement being limited, as by means of the pin 14, which engages the cut-away end of the hub of the segment, and the segment is normally held in the position shown in the drawings by means of a helical spring 11, one end of which is secured to the segment and the other end to a collar or hub 10, fast on the bar 9. The greater portion of the periphery of the eccentric segment is provided with teeth 12, and the portion of the periphery beyond the teeth at the end of greatest radius forms a tail-rib 13. Extending from the face of the eccentric segment is a cam-plate i' , the outer edge of which is at an inclination to the axis of the bar 9. This cam-plate is adapted to engage an abutment formed, as shown, by a post 6, having a horizontal portion which passes through a part of the bearing f^2 and is adjustably secured by means of a set-screw to provide for adjustment of the post longitudinally of the direction of movement of the segment i . The

bracket *h* also carries an arm *k*, which is pivoted to the under side of the bracket, as by means of a stud 16, secured in a recess in the bracket, which recess also serves to receive a spiral spring 17, one end of which is secured to the arm *k* and the other end to the stud 16, the office of said spring being to apply tension to the arm *k* and to hold the arm normally in position with a rearward extension thereof against a stop-pin 18. The forward end of the arm *k* is provided with a downwardly-projecting stud *k'* for engaging the eccentric spiral cam *g*.

The operation is as follows: The bracket *h*, carrying the eccentric segment *i* and arm *k*, moves with the sleeve *d* and reproducer-arm *e* as the reproducer makes its reproducing movement, the eccentric segment being at this time held by the spring 11 in its normal position, as shown in the drawings. As the reproducer draws near the end of the record the cam-plate *i'* comes into engagement with the post 6, so that as the movement continues the eccentric segment *i* is turned to bring its teeth 12 into engagement with the teeth 8 of the auxiliary or return feed-shaft. The segment is then further turned or rotated by the rotation of the auxiliary shaft and its toothed periphery caused to progressively engage the toothed surface of the shaft until the tail-rib 13 is brought into position to enter the groove 7 of the auxiliary shaft. This turning movement of the eccentric segment because of the eccentric or cam form of the segment raises the bracket *h*, and thereby rocks the sleeve *d* and elevates the reproducer-arm *e* to move the point of the reproducer off the record and elevates the feed-arm *d'* to disengage its threaded block from the shaft *b*, thereby interrupting the forward or reproducing movement of said parts. The tail-rib 13 being then brought into position to enter the groove of the auxiliary shaft and the rotation of the auxiliary shaft continuing, a reverse movement is imparted to the bracket *h*, sleeve *d*, reproducer-arm, and feed-arm, said parts then moving toward the left in Fig. 1, and this movement is secured without necessitating any stoppage or change in direction of rotation of the feed-shaft *b*. The rotation of the auxiliary shaft *f* is in a direction opposite to the direction in which the spring 11 tends to move the eccentric segment *i* to return it to the position shown in Fig. 3. Consequently the rotation of the auxiliary shaft, while causing the return movement of the parts, tends to keep the eccentric segment in position with its tail-rib 13 in the groove of the shaft, the weight of the reproducer-arm and feed-arm being at this time supported by the eccentric segment and tending to increase the friction between the tail-rib 13 and the auxiliary shaft. As the parts approach the extreme left-hand end of their return movement, the stud *k'* of the arm *k* comes into engagement

with the eccentric spiral cam *g*, and if a high part of the cam is uppermost the arm *k* yields until a low point of the cam *g*—that is, a point near the surface of the auxiliary shaft—comes opposite the stud *k'*. When such low point of the cam is opposite the stud *k'*, the stud moves over the surface of the cam, and as the cam continues its rotary movement it will by engagement with the stud *k'* cause a further elevation of the bracket *h*, whereby the eccentric segment will be raised to clear the auxiliary shaft. When the eccentric segment is thus raised out of engagement with the auxiliary shaft, it will be returned by the action of the spring 11 to its normal position, (shown in the drawings,) and then by the continued rotation of the cam *g* the bracket *h* will again be lowered, and at the same time stud *k'*, coming into engagement with the spiral shoulder or rib of the cam, will be run off the cam and the parts will return to position, with the threaded block of the feed-arm *d'* in engagement with the feed-shaft *b* and with the reproducer again in reproducing position, and the parts will be in position for another reproducing movement. The coaction of the cam-plate *i'* and post 6 and of the teeth 12 of the eccentric segment with the teeth 8 of the auxiliary shaft effect a gradual operation upon and raising of the reproducer-arm *e* and the parts connected therewith, gradually bringing the tail-rib 13 into the groove 7 for the return movement, and the coaction of the arm *k* and its stud *k'* under the control of the spring 11 with the eccentric spiral cam *g* effects a stopping of this return movement and a gradual lowering of the reproducer-arm and feed-arm into position for another reproducing movement. The adjustment provided for the eccentric spiral cam *g* longitudinally of the auxiliary shaft *f* and the adjustment provided for the bar 9, carrying the eccentric segment *i*, and for the bar 6 in the bearing *f*² is to adapt the mechanism for records of varying lengths, so that the reproducing devices may operate only over the length of the actual record, and so that there may be no time wasted or unnecessary distance traveled by the parts.

The invention provides an exceedingly simple mechanism positive in its action and efficient and having no parts liable to get out of order.

It will be understood that the invention is not to be limited to the exact constructions and arrangements of parts shown, and to which the foregoing description has been mainly confined, but that it includes changes and modifications thereof within the claims. For example, I do not herein limit myself to the employment of the spring-controlled arm *k* or the particular parts associated therewith, as the stud 16 may be tightened and said arm be thus caused to occupy a fixed

position and the eccentric cam *g* be placed in accordance with such a change of the arm. Furthermore, some equivalent structure may be used in lieu thereof without departing from my invention. It will be understood also that the term "phonograph" is used herein as a broad term to include all sound-reproducing machines to which the invention is or may be found applicable.

10 I claim as my invention—

1. In a phonograph, the combination with a threaded feed-shaft, the reproducer-arm and parts connecting the same to the feed-shaft, of a threaded return feed-shaft, a revoluble lifting device whose axis is substantially parallel with the axis of the return-feed shaft so that the device turns at substantially right angles to the line of the return feed-shaft, said revoluble device being adapted to be turned by engagement of successive peripheral portions thereof with the surface of the return feed-shaft for lifting the reproducer-arm.

2. In a phonograph, the combination with a threaded feed-shaft, the reproducer-arm and parts connecting the same to the feed-shaft, of a threaded return feed-shaft, a revoluble eccentric lifting device whose axis is substantially parallel with the axis of the return-feed shaft so that the device turns at substantially right angles to the line of the return feed-shaft, said revoluble device being adapted to be turned by engagement of successive portions of its eccentric peripheral surface with the surface of the return feed-shaft for lifting the reproducer-arm.

3. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble lifting device mounted to move with the reproducer-carrier and whose axis is substantially parallel with the axis of the return feed-shaft so that the device turns at substantially right angles to the line of the return feed-shaft, said revoluble device being adapted to be turned by engagement of successive peripheral portions thereof with the surface of the return feed-shaft for lifting the reproducer from the record and having a part for engaging the thread of said shaft for imparting a return movement to the reproducer-carrier.

4. The combination with the reproducer-carrier of a phonograph, of a threaded return feed shaft, a revoluble eccentric lifting device mounted to move with the reproducer-carrier and whose axis is substantially parallel with the axis of the return feed-shaft so that the device turns at substantially right angles to the line of the return feed-shaft, said revoluble device being adapted to be turned by engagement of successive portions of its eccentric peripheral surface with the surface of the return feed-shaft for lifting the reproducer from the record and having a part for engaging the thread of said shaft for im-

parting a return movement to the reproducer-carrier.

5. In a phonograph, the combination with the reproducer-arm, the sleeve to which the same is connected, a threaded feed-shaft, the mandrel, and the feed-arm connected to the sleeve of the reproducer-arm and adapted for operating the instrument in the usual manner, of a threaded return feed-shaft parallel with the feed-shaft, a revoluble member mounted to move with the reproducer-arm and having an eccentric or cam periphery, means for causing said member to engage the return feed-shaft at the end of the reproducing movement of the reproducer-arm, said member being adapted to be turned by engagement of successive portions of its cam-periphery with the return feed-shaft to raise the reproducer-arm and the feed-arm and having a part adapted to engage the thread of the return feed-shaft to impart a return movement to the reproducer-arm and the feed-arm, and means for again reconnecting the parts to repeat the original movements of the instrument.

6. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft provided with a spiral groove and with teeth on the surface at one end between the convolutions of the groove, an abutment, a device movable with the reproducer-carrier and adapted to be moved into engagement with the return feed-shaft by coming in contact with said abutment, said device having parts adapted thereafter to successively engage the teeth and the groove of said return feed-shaft to raise the reproducer from the record and return the reproducer-carrier by the rotation of the return feed-shaft to its initial position.

7. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft provided with a spiral groove and with teeth on the surface at one end between the convolutions of the groove, an abutment, a device movable with the reproducer-carrier and adapted to be moved into engagement with the return feed-shaft by coming into contact with said abutment, said device having parts adapted thereafter to successively engage the teeth and the groove of said return feed-shaft to raise the reproducer from the record and return the reproducer-carrier by the rotation of the return feed-shaft to its initial position, and means for effecting the disengagement of said device from the return feed-shaft and the return of the operative parts of the phonograph to position for the next reproducing movement.

8. In a phonograph, the combination with a threaded feed-shaft and means operated thereby for reproducing a phonograph or other record, of a threaded return feed-shaft parallel with the feed-shaft and having peripheral teeth at one end, a part associated

with the reproducer portions of the phonograph, a spring-controlled eccentric segment revolubly mounted on said part and normally free from the return feed-shaft and having teeth on its periphery and a tail-rib on one end thereof, a cam-plate carried by said segment, an abutment adapted to engage said cam-plate to turn said segment and bring its toothed portions into engagement with the return feed-shaft, such engagement causing a turning of said segment to cause successive portions of its eccentric periphery to successively engage the return feed-shaft to gradually raise the reproducing devices of the instrument and to bring the tail-rib of the segment into engagement with the thread of the return feed-shaft for returning the reproducing devices to their initial position.

9. In a phonograph, the combination with a threaded feed-shaft and means operated thereby for reproducing the phonograph or other record, a threaded return feed-shaft parallel with the feed-shaft and having peripheral teeth at one end, a bracket-arm associated with the reproducer portions of the phonograph, an eccentric segment revolubly mounted on said bracket-arm and normally free from the return feed-shaft and having teeth on a portion of its periphery and a tail-rib on the same beyond the teeth, a return-spring acting on the segment, a cam-plate on the segment, means for limiting the swinging movement of said eccentric segment, an abutment adapted to engage said cam-plate to turn said segment and bring its toothed portion into engagement with the return feed-shaft, such engagement of the return feed-shaft with said segment causing a turning of said segment to cause successive portions of its eccentric periphery to successively engage the return feed-shaft to gradually raise the reproducing device of the instrument and to bring the tail-rib of the segment into engagement with the groove of the return feed-shaft for returning the reproducing devices to their initial position.

10. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft, an abutment at one end of the return feed-shaft, an eccentric segment mounted to move with the reproducer-carrier, a device connected to the eccentric segment and adapted to come into contact with said abutment for moving said eccentric segment and causing a coaction of the same with the return feed-shaft for raising the reproducer from the record and returning the reproducer-carrier to its initial position.

11. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft, an adjustable abutment, a spring controlled and returnable eccentric segment revolubly mounted to move with the reproducer-carrier, said segment being adapted to

coact with the return feed-shaft to raise the reproducer from the record and return the reproducer-carrier to an initial position, and a device connected to said eccentric segment and adapted to come in contact with said abutment for moving the eccentric segment into engagement with the return feed-shaft, substantially as set forth.

12. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, an abutment, a spring-controlled and returnable eccentric segment revolubly mounted to move with the reproducer-carrier and having a tail-rib formed at one end thereof, a cam-plate carried by the eccentric segment and adapted to engage said abutment at the extreme of the movement of the reproducer-carrier in one direction for turning the eccentric segment into engagement with the return feed-shaft, whereby the segment is then turned to raise the reproducer from the record and to cause the tail-rib thereof to engage with the return feed-shaft for returning the parts to their initial position.

13. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having teeth on its surface at one end, and a revoluble lifting device mounted to turn at substantially right angles to the line of the return feed-shaft and having teeth on a portion of its periphery adapted to engage with the teeth on the return feed-shaft whereby said device is turned for lifting the reproducer from the record.

14. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having teeth on its surface at one end, a revoluble eccentric segment mounted to turn at substantially right angles to the line of the return feed-shaft and having teeth on its periphery adapted to mesh with the teeth of the return feed-shaft and having a thread-engaging part at the end of the segment of greatest radius adapted to engage the thread of the return feed-shaft, and means for bringing the segment into engagement with the return feed-shaft whereby the segment is then turned to lift the reproducer from the record and to bring said thread-engaging part of the segment into engagement with the thread of the return feed-shaft for imparting return movement to the reproducer-carrier.

15. The combination with the reproducer-carrier of a phonograph, of a threaded return feed shaft, a part mounted to have reciprocating movements longitudinally of and toward and from the return feed-shaft to correspond with the reproducing and return movements of the reproducer-carrier and the movements of reproducer toward and from the record-carrier, a member revolubly mounted on said part and having an eccentric or cam periphery, means for holding said member in

position with a low portion of its cam periphery toward the return feed-shaft during the reproducing movement of the reproducer-carrier, and means for causing said member to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier, such engagement of the return feed-shaft with said member causing first a turning of said member to cause successive portions of its cam periphery to successively engage the return feed-shaft to raise the reproducer from the record and then a movement of said member and said part longitudinally of the return feed-shaft to impart a return movement to the reproducer-carrier.

16. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a part mounted to have reciprocating movements longitudinally of and toward and from the return feed-shaft to correspond with the reproducing and return movements of the reproducer-carrier and the movements of the reproducer toward and from the record-carrier, a member revolvably mounted on said part and having an eccentric or cam periphery and adapted to be turned by engagement with the return feed-shaft at the end of the reproducing movement of the reproducer-carrier, such engagement of the return feed-shaft with said member causing first a turning of said member to cause successive portions of its cam periphery to successively engage the return feed-shaft to raise the reproducer from the record and then a movement of said member and said part longitudinally of the return feed-shaft to impart a return movement to the reproducer-carrier.

17. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member mounted to move with the reproducer-carrier and having an eccentric or cam periphery, and means for causing said member to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier, such engagement of the return feed-shaft with said member causing first a turning of said member to cause successive portions of its cam periphery to successively engage the return feed-shaft to raise the reproducer from the record and then a movement of said member longitudinally of the return feed-shaft to impart a return movement to the reproducer-carrier.

18. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having teeth on its surface at one end, a revoluble member mounted to move with the reproducer-carrier and having an eccentric or cam periphery and having teeth on a portion of its periphery and a thread-engaging part beyond the toothed portion, said member being adapted to engage the teeth of the return feed-shaft at the end of the reproducing movement of the reproducer-carrier,

whereby said member is then turned to raise the reproducer from the record and to bring its thread-engaging part into engagement with the thread of the return feed-shaft for imparting return movement to the reproducer-carrier.

19. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member mounted to have a reciprocating movement longitudinally of the return feed-shaft to correspond with the reproducing and return movements of the reproducer-carrier, means whereby a turning of said member will cause the raising of the reproducer from the record, said member being adapted to be turned at the end of the reproducing movement of the reproducer-carrier by the progressive engagement of the return feed-shaft with successive peripheral portions of said member to raise the reproducer from the record and then to be moved longitudinally by the return feed-shaft to impart a return movement to the reproducer-carrier.

20. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having peripheral teeth at one end, and a device movable with the reproducer-carrier and adapted to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier, said device having parts adapted thereafter to progressively engage the teeth and the thread of the return feed-shaft to raise the reproducer from the record and return the reproducer-carrier by the rotation of said shaft to its initial position.

21. The combination with the reproducer-carrier of a phonograph, of a revoluble member having an eccentric or cam periphery and mounted to have a reciprocating movement corresponding to the movement of the reproducer toward and from the record, actuating means for engaging the cam periphery of said member at the end of the reproducing movement of the reproducer-carrier to turn said member and cause successive portions of its cam periphery to successively engage said actuating means to raise the reproducer from the record.

22. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member having an eccentric or cam periphery, one of which last-mentioned parts is mounted to move with the reproducer-carrier, and means for causing said parts to engage with each other at the end of the reproducing movement of the reproducer-carrier whereby the revoluble member is first turned to cause successive portions of its cam periphery to successively engage the return feed-shaft to raise the reproducer from the record and then a return movement is imparted to the reproducer-carrier.

23. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member, one of which last-mentioned parts is mounted to have a reciprocating movement longitudinally of the return feed-shaft to correspond with the reproducing and return movements of the reproducer-carrier, means whereby the turning of said revoluble member will cause the raising of the reproducer from the record, and means for causing said parts to engage with each other at the end of the reproducing movement of the reproducer-carrier, whereby the revoluble member is first turned by the progressive engagement of the shaft with successive peripheral portions of said member to raise the reproducer from the record and then a return movement is imparted to the reproducer-carrier.

24. The combination with the reproducer-carrier of a phonograph, of a revoluble member mounted to have a reciprocating movement corresponding to the reproducing and return movements of the reproducer-carrier, means whereby the turning of said member will cause the raising of the reproducer from the record, and an actuating member for turning said revoluble member at the end of the reproducing movement of the reproducer-carrier by progressive engagement with successive portions of the revoluble member to raise the reproducer from the record.

25. The combination with the reproducer-carrier of a phonograph, of a revoluble member mounted to move with the reproducer-carrier, and an actuating member for turning the revoluble member at the end of the reproducing movement of the reproducer-carrier by progressive engagement with successive peripheral portions of the revoluble member, one of said members having an eccentric or cam form whereby the progressive engagement of successive portions of said members with each other will cause the revoluble member to be moved bodily to raise the reproducer from the record.

26. The combination with the reproducer-carrier of a phonograph, of a lifting member mounted to move with the reproducer-carrier

and to reciprocate independently of its movement with the carrier, and an actuating member having an engaging face successive portions of which successively engage successive portions of the engaging face of the lifting member to reciprocate the lifting member at the end of the reproducing movement of the reproducer-carrier, one of said members being a revoluble member and the engaging face of one of said members being of cam form, whereby the reciprocation of the lifting member by the actuating member will cause the lifting member to be moved bodily in a direction transverse to such reciprocating movement thereby raising the reproducer from the record.

27. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having gear-teeth at or near one end thereof, and a device mounted to move with the reproducer-carrier and movable at substantially right angles to the line of the return feed-shaft and having a thread-engaging part for engaging the thread of the return feed-shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement and having a part to coact with the gear-teeth of the return feed-shaft for moving said device in a direction at substantially right angles to the line of the return feed-shaft to raise the reproducer from the record and to bring the thread-engaging part of said device into engagement with the thread of the return feed-shaft.

28. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having gear-teeth at or near one end thereof, and a device for coöperating with the return feed-shaft for returning the reproducer-carrier to normal position, said device having a part for coacting with the gear-teeth of the return feed-shaft for raising the reproducer from the record.

Signed by me this 20th day of July, 1903.

WILLIAM W. ROSENFELD.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.

M. JOYCE.
METHOD OF DUPLICATING PHONOGRAMS.
APPLICATION FILED OCT. 13, 1897.

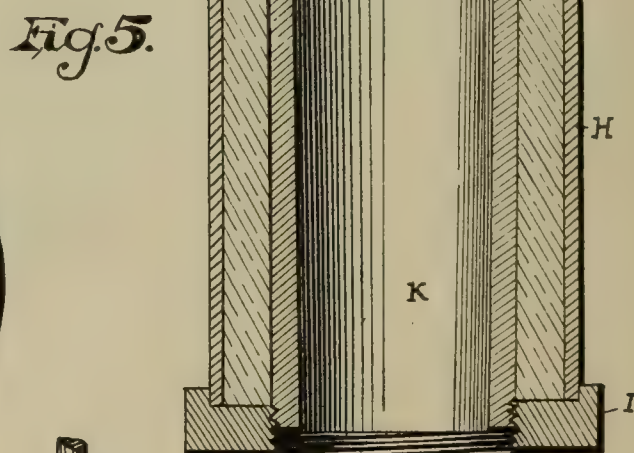
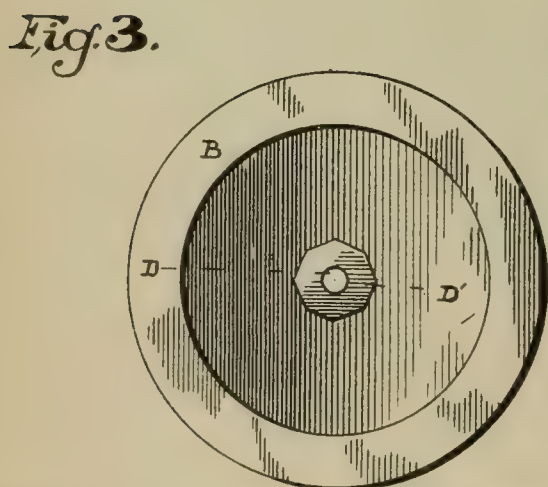
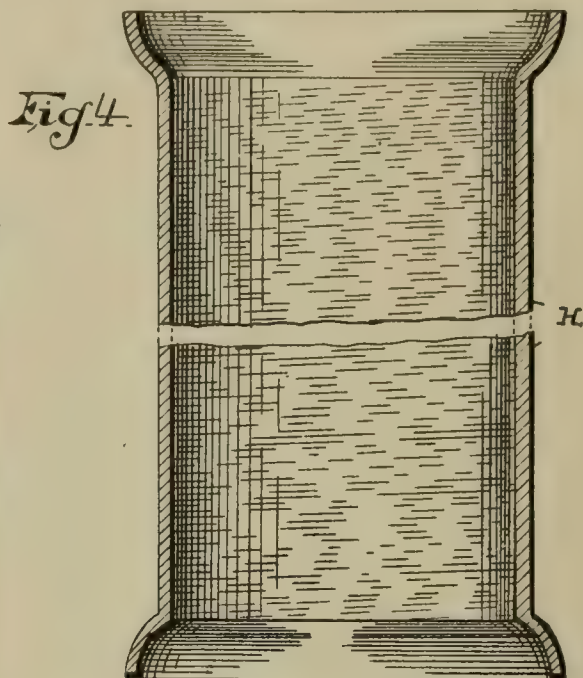
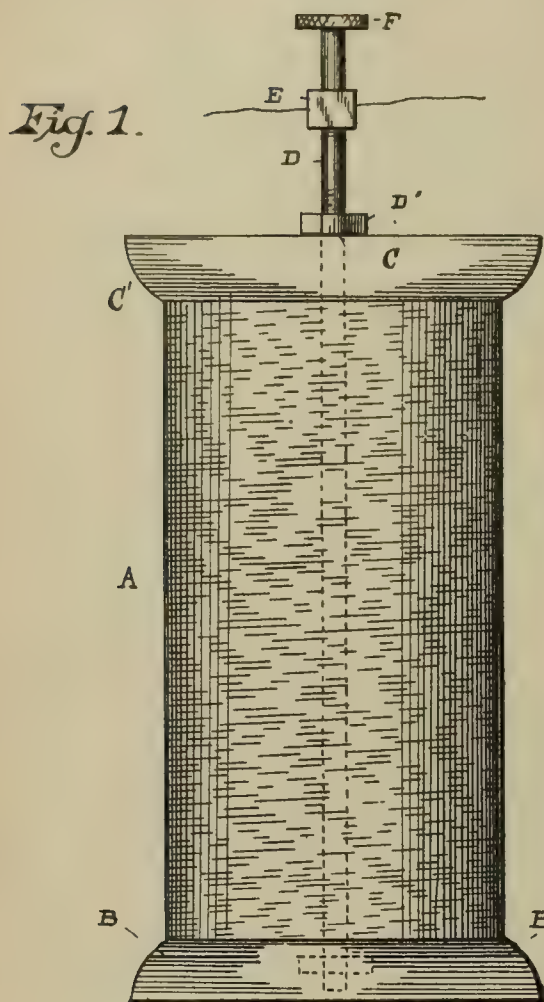
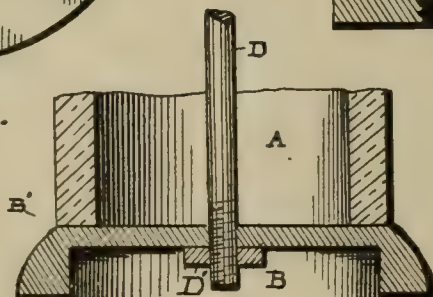


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

MAURICE JOYCE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR,
BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF
WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF DUPLICATING PHONOGRAMS.

No. 831,668.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed October 13, 1897. Serial No. 655,027.

To all whom it may concern:

Be it known that I, MAURICE JOYCE, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Methods of Duplicating Phonograms, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to the method of duplicating or multiplying phonogram-cylinders.

The object of the invention is to reproduce facsimiles of phonogram-cylinders in as large numbers as may be desirable, and these cylinders are reproduced according to this invention in the manner hereinafter set forth.

Figure 1 is a side elevation of a phonogram with metallic end connections ready for application to an electrodeposition apparatus. Fig. 2 is a broken cross-section of a phonogram and one of the metallic end pieces and connections; Fig. 3, a face view of one metallic end piece. Fig. 4 is a broken longitudinal section of metallic mold or shell; Fig. 5, a section of mold with all parts assembled and duplicate phonogram or wax therein.

The cylinder or phonogram to be reproduced by this invention is the usual form of hollow wax cylinder, or it may be a conic frustum having the characters impressed or indented in its outer surface. I take such a cylinder and make a metallic contact with both ends. Thus A indicates the original phonogram. B is a copper or other metallic piece having a hollow base or cup and a flat disk like a cup-bottom against which the end of the phonogram is applied. The edge of this cup is made tapering, as at B'.

The cap C is somewhat similar to the base B; but as it is not necessary that this cap shall contain the retaining-nut no recess is required. The outer edge of this cap tapers at C', and the disk-face rests against the end of the phonogram. A metallic rod D passes through both end pieces B and C, and all the parts are held firmly in contact by the nuts D' engaging threads on this rod.

The upper end of the rod D has a metallic head E, to which the wire from an electric battery or machine is connected in usual manner, as by binding-screw F.

The parts having been assembled, as in Fig. 1, a close-fitting wax joint is made be-

tween the wax phonogram A, and the metallic ends B and C, and the surface of the phonogram and the end pieces are black-leaded. The phonogram and the metallic end pieces are then placed in a battery for electrodeposition. The end B may rest on the bottom of the battery to insure good contact. The battery fluid should come at least to the top of the cap C and preferably extend above the same. By usual means of electrodeposition copper or other metal may now be deposited, and a hollow cylinder can thus be made with its inner surface in contact with every part of the phonogram. An exact reproduction in reverse of the phonogram is thus made on the shell. This metallic shell I call a "mold." The flaring or rounded metallic end pieces B and C form, with the cylinder, a surface on which metal may be readily deposited.

The means for electrodepositing are old and well known. I assume no special novelty therein, except, perhaps, for a convenient means of holding a phonogram for use in a battery.

After the metal shell or mold has been obtained the parts are disconnected and the wax phonogram-cylinder A is melted or removed, leaving the copper or metal mold H Fig. 4, with the phonogram in reverse on its inner surface. The mold H is made with tapering or flaring ends for the purpose of affording a mouth into which melted wax can be poured. One flaring end is cut off the mold; but by having two flaring or cupped ends that one can be selected which is most desirable. After cutting off one of the ends the outside of that end of the mold is trued up in a lathe to exactly fit a base or holder I, in which a holding-cup is made, or if an exact fit be not made the mold H may be held in base I by a filling of wax or plaster, so that the mold is held firmly. A tapering core K, preferably tubular, has one end cylindrical and screw-threaded, and this screw-threaded end enters a socket in the base-piece I, so that the core is exactly central of the mold H. The mold, core, and base are slightly oiled and then heated, preferably, to near the temperature of melted wax. This heating expands mold H slightly. Then melted wax L is poured into the hot mold and fills the space between the mold H and the core K. After

the wax has been poured it will generally have the exact form of the mold when cool: but under certain circumstances the wax cast may be subjected to pressure in any of the usual ways. A hydraulic, pneumatic, or other pressure may be applied to the wax column, as is done in casting metals. A good way to apply pressure, however, is to wait until the wax has partly set and then screw down the tapering core into its base I. This not only compresses, but expands the wax outwardly, insuring that all parts of the mold are impressed into and reproduced by the wax. The mold and contents may now be cooled by immersing all in a bath of cold water, or cold water may be passed through the hollow core K, or other cooling means may be employed. The cooling of the wax, which is of usual phonogram compound, causes it to shrink away from mold H, and the wax duplicate phonogram can now be removed from the end of the mold, the shrinkage being great enough to permit this removal without injury to the phonogram-record by direct longitudinal movement of the phonogram. By a repetition of the molding process multiplied copies can be obtained to any extent.

The core is preferably withdrawn from the mold with the phonogram adhering thereto. Then the core may be removed and the ends of the phonogram dressed up, so that the new phonogram is an exact reproduction of the original, or the core may be permanently left in the phonogram.

I have described a method and mechanisms for carrying the same into effect in the best manner known to me. It must be understood that I avail myself of the mechanical knowledge available in the electrotypers' and allied arts and that where equivalent steps are known I contemplate their use also.

My invention is as broad as my claim. Where I have indicated a "wax" phonogram it must be understood as applying to a phonogram of plastic material. When I refer to "black-leading," other conductive materials used as an equivalent in the electrotypers' art may be used instead of graphite. My duplicates may be made of any fusible substance used for phonograms, provided the shrinking of the material or the expansion of the metallic shell permits the withdrawal of the duplicate from the mold.

What I claim is—

1. The process of making phonograph-cylinders which consists in introducing molten

material into a mold having a hollow core, and applying cold to the inner surface of the core by immersion of the mold, substantially as set forth.

2. The process of making phonograph-records which consists in introducing molten material into a mold having a hollow core, and applying cold to the outer surface of the mold and inner surface of the core, substantially as described.

3. The process of duplicating sound-records in wax-like material which consists in casting within a hot, seamless, tubular record-mold, fused wax-like material at substantially the same temperature as the mold, cooling the mold and contents so as to cause the material to shrink away from the surface of the mold, and removing the hardened casting longitudinally from the mold, substantially as set forth.

4. The process of duplicating sound-records in wax-like material which consists in casting within a hot, seamless, tubular record-mold, fused wax-like material at substantially the same temperature as the mold, allowing the material to set, cooling the mold and contents so as to cause the material to shrink away from the record-surface of the mold, and removing the hardened casting longitudinally from the mold, substantially as set forth.

5. The process of duplicating sound-records in wax-like material, which consists in casting within a hot, seamless, tubular record-mold, fused wax-like material at substantially the same temperature as the mold, allowing the material to set, applying pressure to the set material, cooling the mold and contents so as to cause the material to shrink away from the surface of the mold, and removing the hardened casting longitudinally from the mold, substantially as set forth.

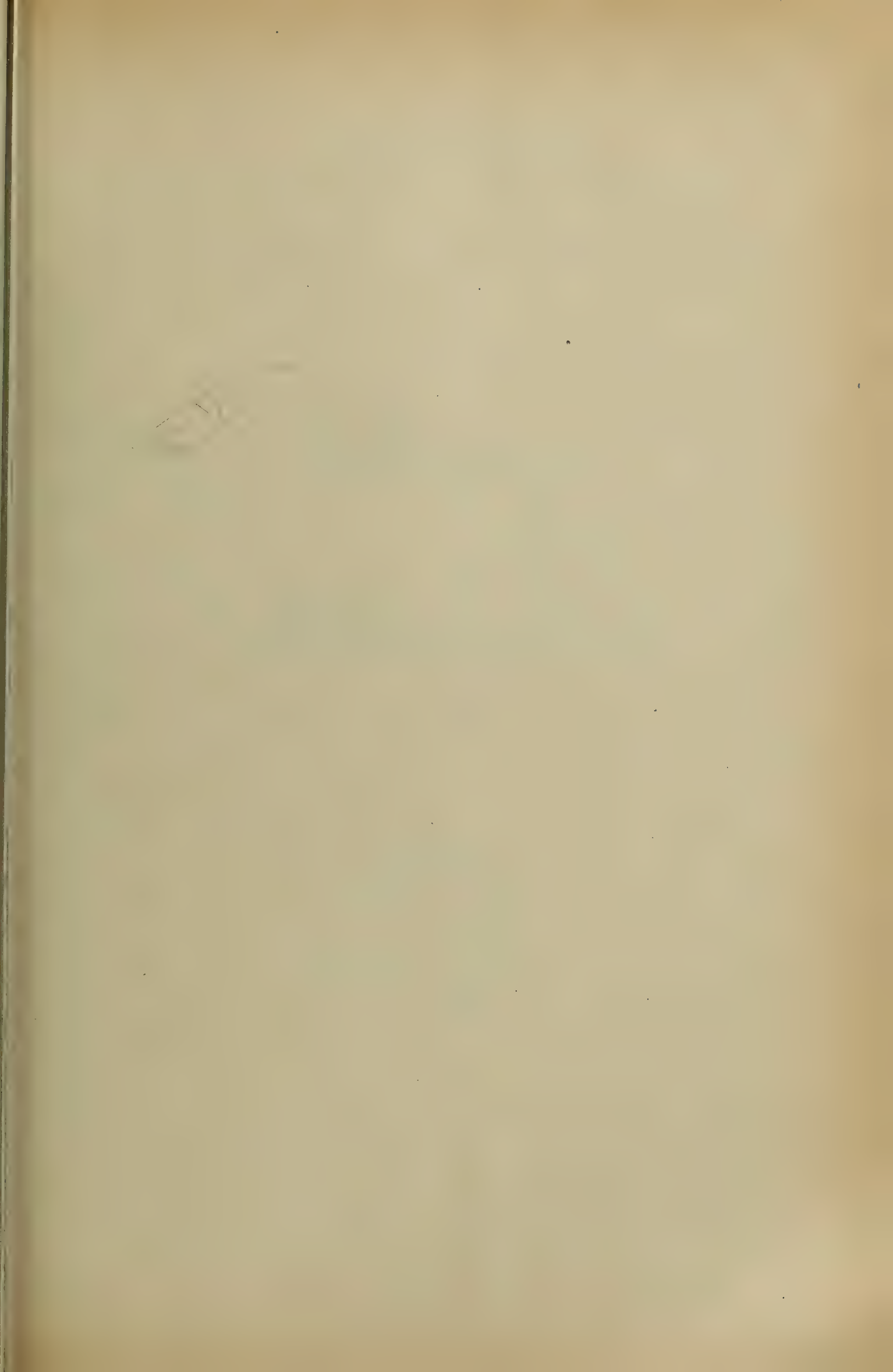
6. The process of duplicating sound-records in wax-like material, which consists in casting within a hot, seamless, tubular record-mold, fused wax-like material at substantially the same temperature as the mold, placing the mold in a water-bath and removing the hardened casting longitudinally from the mold, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MAURICE JOYCE.

Witnesses:

THOMAS J. STALEY,
W. A. BARTLETT.



No. 831,779.

PATENTED SEPT. 25, 1906.

V. H. EMERSON.
MAGNETIC SOUND RECORD.

APPLICATION FILED JAN. 14, 1904. RENEWED MAR. 2, 1906.

FIG. 1.

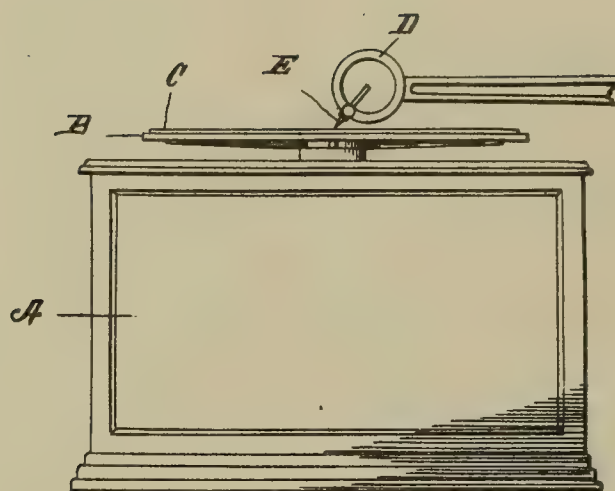
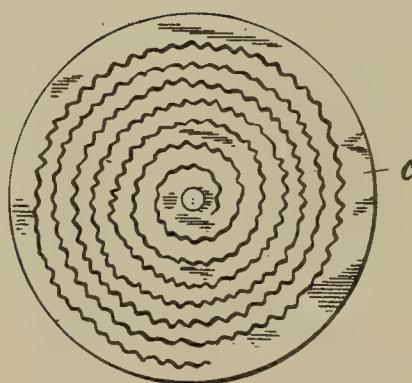


FIG. 2.



Witnesses
Chas. A. Davies.
Wm. B. Kerkam.

Inventor
Victor H. Emerson,

By Hauer, Cameron, Lewis & Massie
Attorneys

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

MAGNETIC SOUND-RECORD.

No. 831,779.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed January 14, 1904. Renewed March 2, 1906. Serial No. 303,876.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, of Newark, county of Essex, State of New Jersey, have invented a new and useful Improvement in Magnetic Sound-Records, which is fully set forth in the following specification.

My invention consists of the production of a magnetic sound-record and in the several details hereinafter set forth.

It will best be understood by reference to the accompanying drawings, forming part of this specification and in which for convenience I illustrate the invention as applied to a disk form of machine and tablet.

In the drawings, Figure 1 represents a side view of a talking-machine, illustrating my invention. Fig. 2 is a plan view of a sound-record produced in accordance with my invention.

A represents any ordinary talking-machine motor, and B is the turn-table carried thereby in operative relation to a recording device or sound-box. Upon this table B instead of the recording-tablets heretofore employed I make use of a disk or tablet of non-magnetic material C—such as glass, brass, copper, or preferably emery paper or cloth. Carried by the sound-box D in place of the recording-needle now employed is a needle E, that presses upon the surface of the non-magnetic disk C and is vibrated by the diaphragm in the usual manner while the disk rotates. This needle E is magnetic or magnetized and is of such consistency that it will act upon the surface of the disk C in a manner analogous to that of chalk, crumbling off in almost invisible particles and leaving behind on the disk C a thin line of its own magnetic material. This needle is preferably composed of fine-powdered steel pressed and held together to form a needle in the same manner as in the case of carbon in the well-known carbon pencils of electric-arc lamps. The result of this

operation is to obtain a sound-record consisting of a non-magnetic tablet having a sinuous spiral line imparted to it, which line is both magnetic and corresponds in its irregularities with the original sound-waves. For the purpose of reproduction this magnetic sound-record is placed upon a similar talking-machine, except that in place of the recording-needle just employed I substitute a fine-pointed needle of iron or steel, which is connected to the diaphragm, but does not actually touch the magnetic line on the record, but is in very close proximity. As the turntable revolves and the record is carried beneath the reproducing-needle the magnetism of the line F draws the needle to and fro, producing vibrations which are imparted to the diaphragm, which vibrations, among other merits, are free from the scratching scraping sounds heretofore apparently inseparable from disk records.

I have thus described one particular embodiment of my invention, but subject to modifications to be made in the same without departing from the spirit of my invention.

I claim—

1. A sound-record consisting of a tablet of non-magnetic material having deposited thereon an irregular magnetic line corresponding to sound-waves.

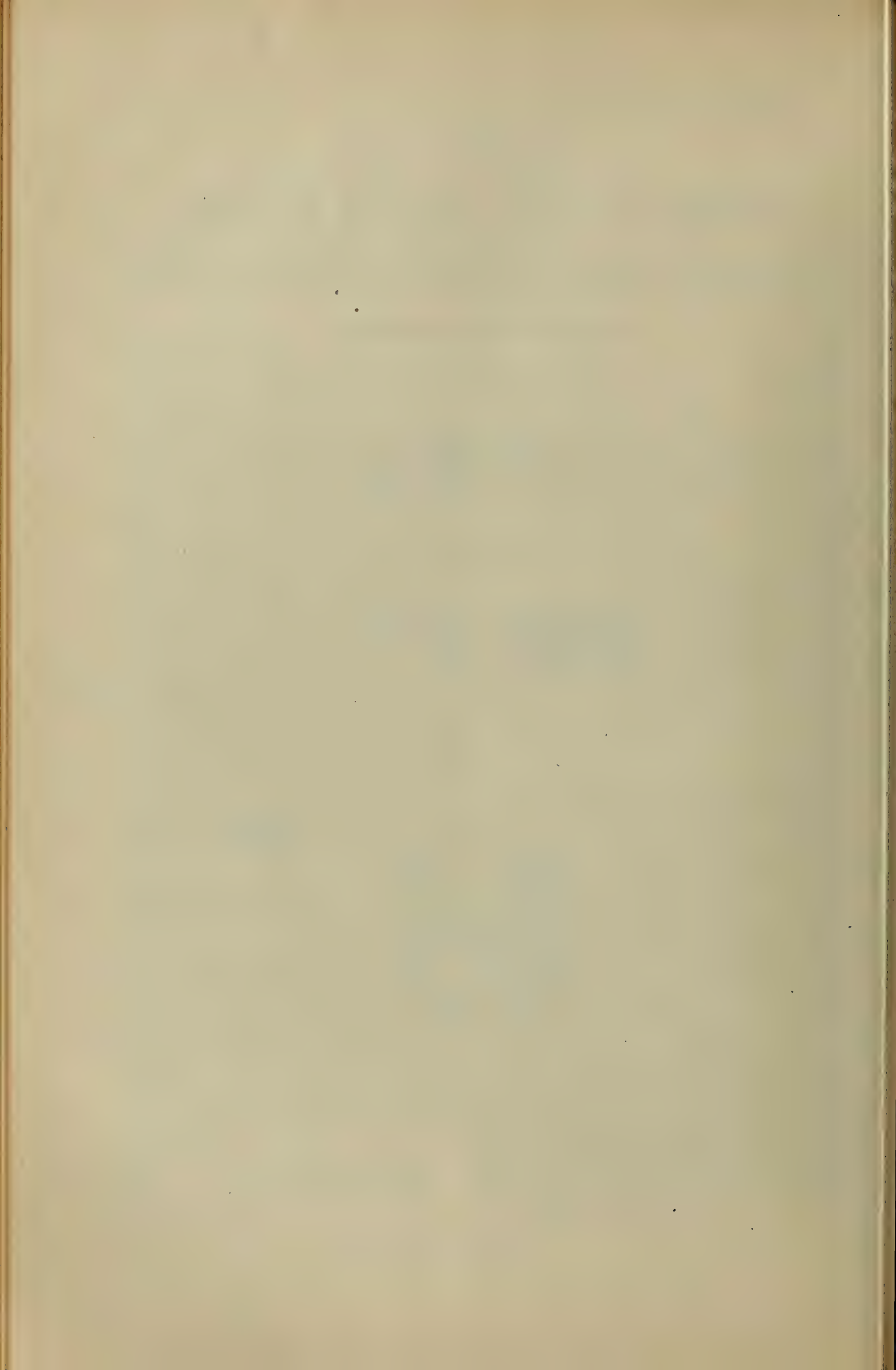
2. The art of producing magnetic sound-records which consists in depositing upon the surface of a non-magnetic tablet a thin line or tracing produced thereon by the crumbling action of a magnetic needle while the latter is being actuated in accordance with sound-waves.

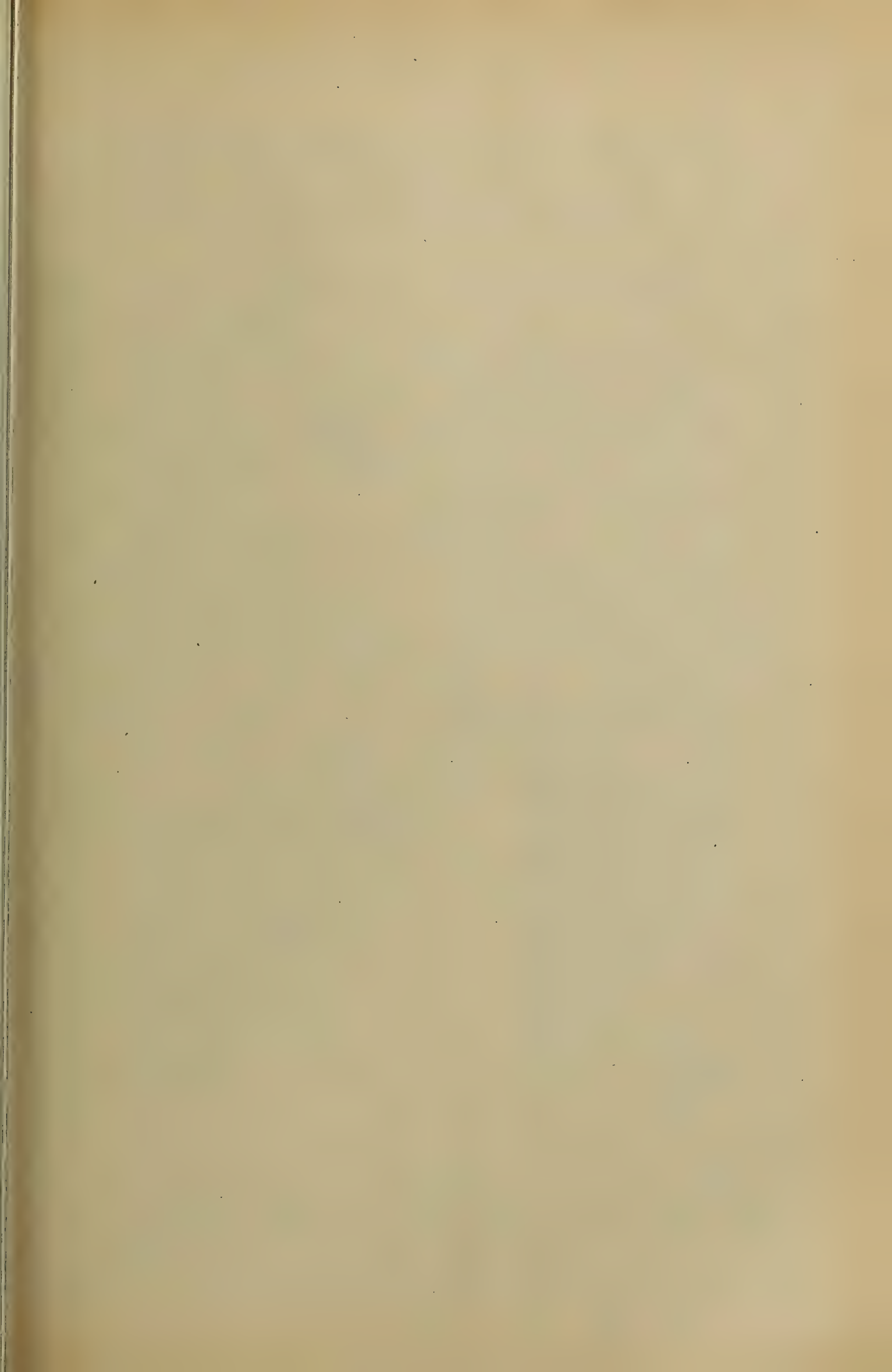
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,
RALPH LANE SCOTT.



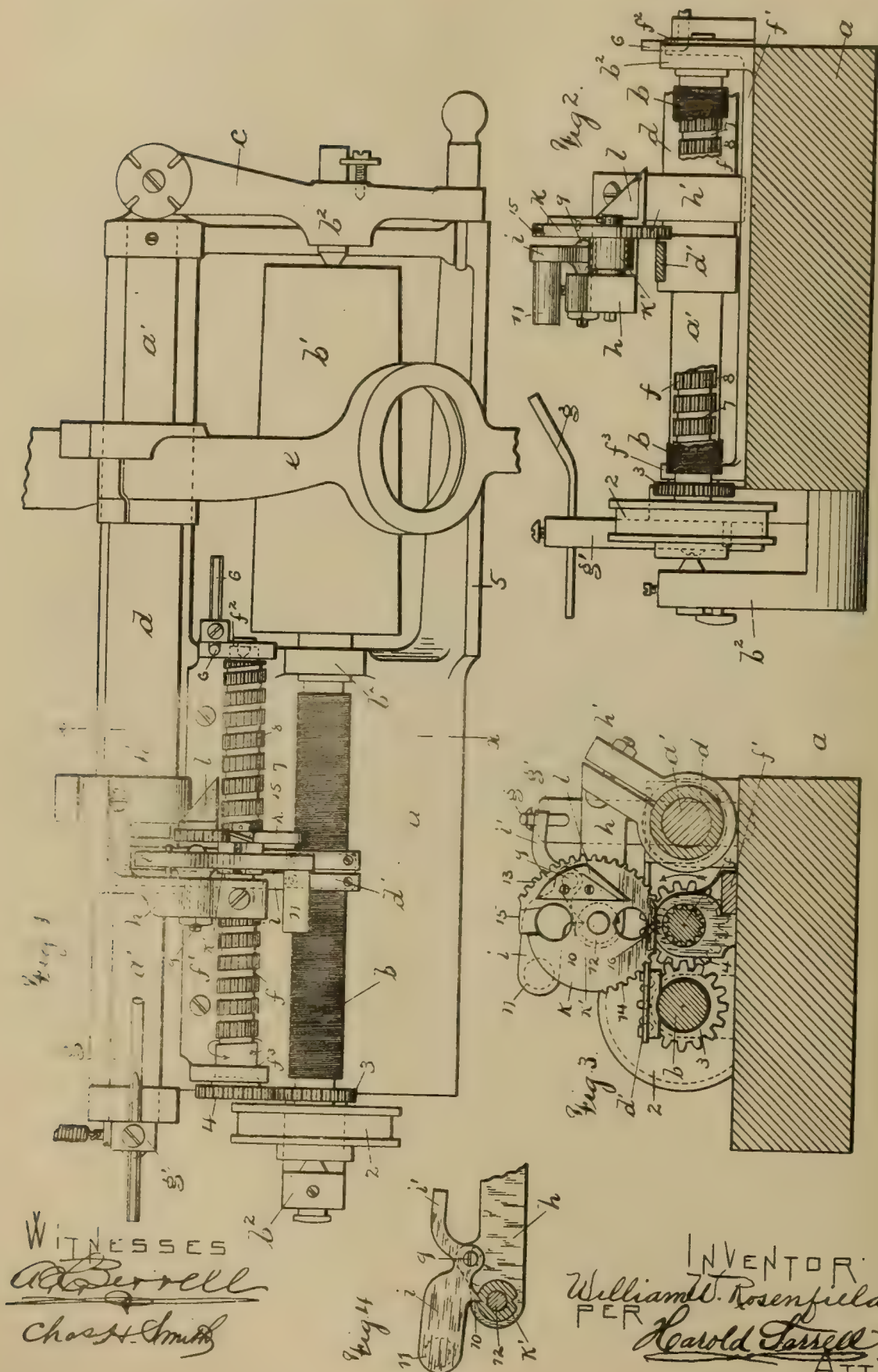


No. 831,895.

PATENTED SEPT. 25, 1906.

W. W. ROSENFELD.
PHONOGRAPH.

APPLICATION FILED NOV. 28, 1903. RENEWED FEB. 20, 1906.



WITNESSES
Chas. H. Smith
W. W. Rosenfield

INVENTOR
William W. Rosenfield
PER
Harold L. Smith
ATTY

UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 831,895.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed November 28, 1903. Renewed February 20, 1906. Serial No. 302,052.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented an Improvement in Phonographs, of which the following is a specification.

This invention relates to automatic return mechanism for phonographs; and the invention is an improvement on the construction shown and described in my application for Letters Patent of the United States, filed July 23, 1903, Serial No. 166,678, Renewal No. 215,180.

A full understanding of the invention can best be given by a detailed description of a preferred construction embodying the various features thereof, and such a description will now be given in connection with the accompanying drawings, showing such a construction.

In said drawings, Figure 1 is a plan view of a phonograph provided with an automatic return mechanism embodying my invention. Fig. 2 is an elevation of the return mechanism and parts of the phonograph with the feed-shaft and the auxiliary or return feed-shaft broken away so as to more clearly show other parts. Fig. 3 is a section on line $x x$ of Fig. 1 looking toward the left. Fig. 4 is a detail view, partly in section, of parts which will be hereinafter described.

Referring to the drawings, a represents the usual bed of a phonograph or similar machine; b , the threaded feed-shaft; b' , the mandrel, which is shown as carried by the feed-shaft; b^2 , bearings for the feed-shaft and mandrel, and 2 the driving-pulley for the feed-shaft. The back bar a' carries a sliding sleeve d of usual construction, to the right-hand end of which is secured the reproducer arm or carrier e , the free end of which reproducer arm or carrier is supported during its reproducing movement by a rest 5. The drawings do not show the reproducer proper, but only the annular support for receiving the same. The sleeve d also carries a feed-arm d' , provided with the threaded feed-block of usual construction to engage the thread of the feed-shaft d , so that movement is communicated in the usual manner from the shaft b through the feed-arm d' to the sleeve d and to the reproducer-arm e , causing the same to move longitudinally of the record on the mandrel b' . c is a swinging

arm carrying the end bearing b^2 for the mandrel. The parts above described are or may be of usual construction.

An auxiliary shaft f , which serves as the return feed-shaft, is mounted parallel with the feed-shaft b in bearings $f^2 f^3$ on an auxiliary bed or plate f' , which rests upon and is secured to the bed a , and on the end of this shaft adjacent to the bearing f^3 is a gear 4, meshing with a gear 3 on the feed-shaft b . The shaft f is provided with a spiral groove or screw-thread 7, and the surface of the shaft between the convolutions of the spiral groove is provided with teeth 8.

A bracket h is carried by the sleeve d , being secured to the sleeve by means of an arm h' , split and clamped to the sleeve by a set-screw, as shown in Fig. 3. The bracket h carries a pivot pin or arbor 12, on which an eccentric or cam disk k is rotatably mounted. This eccentric or cam disk is provided with a hub k' , having opposite longitudinal notches, and the periphery of the disk is formed with two series of teeth 13 and 14, adapted to coact with the teeth of the return feed-shaft, with a rib 15 at one end of the series of teeth 13 and at a high part of the periphery adapted to enter the spiral groove 7 of the return feed-shaft to coact therewith to impart return movement to the reproducer-carrier and with a flat portion or space 16 between the series of teeth and at a low part of the periphery. The disk will thus have a portion of its periphery between the flat portion 16 and the rib 15 of progressively-increasing radius and a portion beyond the rib 15 of progressively-decreasing radius. Extending from the face of the disk k is a cam-plate l , the outer edge of which lies at an angle to the axis of the disk and is adapted to engage an abutment formed, as shown, by a post 6, having a horizontal portion which passes through a part of the bearing f^2 and is adjustably secured therein to provide for adjustment of the post longitudinally of the direction of movement of the disk k .

Pivoted to the bracket h at 9 is a latch-arm i , having a tooth 10 for engaging the notches in the hub k' , said latch-arm being weighted or overbalanced by means of a weight 11, so that its tooth 10 normally bears against the hub k' . Said arm also has an end i' , projecting on the other side of the pivot from the tooth 10 for engaging a cam rod or arm

g, which is adjustable longitudinally in a post *g'*, extending from the left-hand support of the bar *a'*.

The operation is as follows: During the reproducing operation of the phonograph the bracket *h*, carrying the cam or eccentric disk *k*, moves with the sleeve *d* and reproducer-arm or carrier *e* as the latter are moved to the right in Fig. 1 through the action of the feed-shaft *b* on the feed-nut carried by the feed-arm *d'*. During such movement the eccentric disk is held in the position shown in Fig. 3, with the rib 15 and the high part of the disk uppermost and with the flat space 16 of the disk adjacent to but out of contact with the return feed-shaft *f*, the disk being held in this position during the reproducing operation by the latch-arm *i*, the tooth 10 of which lies in one of the notches in the hub *k'*. As the reproducer-carrier approaches the end of its reproducing movement the cam-plate *l* on the disk *k* comes into engagement with the post 6, and as the movement continues the disk is thereby turned to bring its teeth 13 into engagement with the teeth 8 of the return feed-shaft *f*. The disk is then further turned or rotated by the rotation of the return feed-shaft and its toothed periphery caused to progressively engage the toothed surface of the shaft until the rib 15 is brought into position to enter the groove 7 of the shaft. This turning movement of the eccentric disk, because of its eccentric or cam form, raises the bracket *h*, and thereby rocks the sleeve *d* and elevates the reproducer-arm or carrier *e* to raise the point of the reproducer away from the record and also raises the feed-arm *d'* to disengage its threaded block from the shaft *b*, thereby interrupting the forward or reproducing movement of such parts. When the rotation of the disk *k* begins, the tooth 10 of the latch-arm *i* is forced out of the notch in which it has been resting in the hub *k'*, and the tooth then rests on the smooth surface of the hub as the rotation of the disk continues until the rib 15 is brought into position to enter the groove 7 of the return feed-shaft. The tooth 10 of the latch *i* then drops into the other notch of the hub *k'* and holds the disk against further turning movement, and the disk, the bracket *h*, sleeve *d*, reproducer-arm, and feed-arm are then by the continued rotation of the return feed-shaft given a return movement (toward the left in Fig. 1) until the end *i'* of the latch *i* runs under the bent end of the arm *g*, whereby the end *i'* of the latch is pressed down and the tooth 10 withdrawn from the notch in the hub *k'*. The eccentric disk is thereby released and resting on the return feed-shaft it is given a further turning movement thereby to bring successive portions of the portion of its periphery of decreasing radius into engagement with the shaft, whereby the bracket *h* and the reproducer-arm are gradually lowered until the re-

producer is returned to operative position and the feed-nut is again in engagement with the feed-screw *b*, and the parts are thus returned to position for another reproducing operation. The teeth 14 on the latter part of the portion of the periphery of the eccentric disk of decreasing radius insure the disk being turned until the flat portion 16 is again brought opposite to the auxiliary shaft *f*.

The notches in the hub *k'* are preferably of different shape in cross-section, as shown in Figs. 3 and 4, one being of flattened V shape, while the other has one wall substantially radial, and the tooth 10 has its holding side in a plane substantially radial of the hub. During the reproducing operation of the phonograph the cam-disk is held against turning by the tooth 10, extending into the flattened V-shaped notch, and the tooth is thus easily forced out of the notch by the turning of the disk when the cam-plate *l* comes into engagement with the post 6, and the disk is then free to be turned until the other notch is brought into position to receive the tooth 10. When the tooth enters this other notch, the disk is locked by the engagement of the radial faces of the tooth and notch, as shown in Fig. 4, and it is thus during the return movement of the reproducer-carrier and connected parts held securely against the turning strain due to the engagement of the rib 15 of the disk with the rotating shaft *f* until the projecting end *i'* of the latch-arm runs under the inclined arm *g*, and the latch is thereby moved to release the disk and permit it to make its further partial rotation for returning the reproducer and feed-nut to operative position.

The adjustment provided for the post 6 and arm *g* is for the purpose of adapting the mechanism to records varying in length and position on the mandrel, so that the reproducing devices may operate only over the length of the actual record.

The several parts are so constructed, arranged, and timed that the operations hereinbefore described are automatically repeated at the end of the movements in opposite directions and without any action on the part of an operator or attendant.

It will be understood that the term "phonograph" is used herein as a broad term to include all sound-reproducing machines to which the invention is or may be found applicable.

What I claim is—

1. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a lifting device movable with the reproducer-carrier, means for holding said device during either longitudinal movement, means at one end of the return feed-shaft adapted to turn said device in one direction to lift the reproducer from the record, and means at the other end of the return feed-shaft adapted to operate the holding means

to release said device to permit it to return to an initial position.

2. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft provided with a spiral groove and with teeth on the surface between the convolutions of said groove, an abutment, a revoluble device movable with the reproducer-carrier and adapted to be turned by said abutment to engage the return feed-shaft, parts connected with said revoluble device and adapted to progressively engage the teeth and the groove of the return feed-shaft to lift the reproducer from the record and to return the reproducer-carrier by the rotation of the return feed-shaft to an initial position, means for holding the revoluble device against turning, and a device at the opposite end of the return feed-shaft from the abutment for moving the holding means to release said revoluble device to permit it to complete its rotary movement for returning the reproducer to operative position.

3. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble device mounted to move with the reproducer-carrier, a hub with oppositely-located notches forming a part of said revoluble device, a latch adapted to engage the notches of said hub to hold the revoluble device in its respective positions, means for turning said revoluble device at the end of the reproducing movement of the reproducer-carrier to lift the reproducer from the record, and a device for moving said latch to release the revoluble device to permit the parts to return to operative position at the end of the return movement of the reproducer-carrier.

4. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a support mounted to move with the reproducer-carrier, an eccentric disk pivotally mounted on said support, a latch-arm mounted on said support to coact with the eccentric disk for holding the same during its respective movements, means for turning the eccentric disk at the end of the reproducing movement of the reproducer-carrier to lift the reproducer from the record, and an adjustable arm for engaging the latch-arm to release the eccentric disk at the end of the return movement of the reproducer-carrier to permit the disk to make a further turning movement for returning the reproducer to operative position.

5. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, an eccentric disk mounted to move with the reproducer-carrier, a hub secured to turn with the eccentric disk and having opposite axial notches, a pivoted latch-arm also mounted to move with the reproducer-carrier and having a part adapted to engage the notches of said hub and also

having a rearward projection, a cam-plate on the face of the eccentric disk, an abutment for engaging said cam-plate at the end of the reproducing movement of the reproducer-carrier to turn the disk into engagement with the return feed-shaft whereby the disk is turned to raise the reproducer from the record, and an adjustable arm for engaging the rearward projection of the latch-arm to move the latch-arm so as to release the hub and eccentric disk to permit the eccentric disk to make a further turning movement for returning the reproducer to operative position.

6. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft having a spiral groove and teeth on its surface between the convolutions of the groove, an eccentric disk mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having two series of peripheral teeth 13 and 14 and an intermediate flat space 16 at a low portion of its periphery and a rib 15 at the end of the series of teeth 13 at a high portion of its periphery, a hub secured to turn with the eccentric disk having opposite axial notches, a latch-arm *i* adapted to engage the notches of the hub to hold the disk in either one of two positions and having a rearward projection *i'*, means for turning the disk at the end of the reproducing movement of the reproducer-carrier to bring its series of peripheral teeth 13 into engagement with the teeth of the return feed-shaft whereby the disk is then turned to lift the reproducer from the record and to bring its rib 15 into engagement with the spiral groove of the shaft for imparting a return movement to the reproducer-carrier, and an arm *g* for engaging the projection *i'* to move the latch-arm *i* at the end of the return movement of the reproducer-carrier for releasing the eccentric disk to permit it to be given a further rotation by the return feed-shaft for returning the reproducer to operative position.

7. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, an eccentric disk movable with the reproducer-carrier, means for holding the eccentric disk against turning, means for bringing said disk into engagement with the return feed-shaft at the end of the reproducing movement of the reproducer-carrier whereby the disk is then turned by engagement with the return feed-shaft to lift the reproducer from the record, and means for releasing the disk from the holding means at the end of the return movement of the reproducer-carrier to permit said disk to be given a further turning movement by the return feed-shaft for returning the reproducer to operative position.

8. The combination with the reproducer-carrier of a phonograph, of a return feed-shaft having a spiral groove and gear-teeth

on the surface of the shaft between the convolutions of the groove, an eccentric disk mounted to move with the reproducer-carrier and having teeth on its periphery adapted to engage the teeth of the return feed-shaft and having a part adapted to engage the spiral groove of the return feed-shaft for imparting a return movement to the reproducer-carrier, means for causing the eccentric disk to be turned by engagement of its peripheral teeth with the gear-teeth of the return feed-shaft at the end of the return movement of the reproducer-carrier to lift the reproducer from the record and to bring the groove-engaging part of the disk into engagement with the spiral groove of the shaft, means for holding the disk against turning during the return movement, and means for releasing the disk from the holding means at the end of the return movement of the reproducer-carrier to permit the disk to be given a further turning movement by the return feed-shaft for returning the reproducer to operative position.

9. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a lifting device movable with the reproducer-carrier for lifting the reproducer from the record and adapted to engage the return feed-shaft, a counterweighted latch-arm also movable with the reproducer-carrier and adapted to hold said lifting device against turning, and means for moving said latch-arm for releasing said lifting device.

10. In a phonograph, the combination with the feed-shaft, the reproducer-arm, its sleeve and the feed-arm connected thereto for engaging the feed-shaft, of a return feed-shaft provided with a spiral groove and with teeth on the surface between the convolutions of said groove, an abutment, a revoluble device movable with the reproducer-arm and adapted to be turned by said abutment to engage the return feed-shaft, parts connected with said revoluble device and adapted to progressively engage the teeth and the groove of the return feed-shaft to lift the reproducer-arm and to return the same by the rotation of the feed-shaft to an initial position, means for holding the revoluble device against turning, and a device at the opposite end of the return feed-shaft from the abutment for moving the holding means to release the revoluble device to permit it to complete its rotary movement for returning the parts to operative position.

11. In combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having a part for engaging the thread of the return feed-shaft to impart a return movement to the reproducer-carrier, means for moving said member into

engagement with the return feed-shaft at the end of the reproducing movement of the reproducer-carrier whereby said member is then turned to lift the reproducer from the record and to bring the thread-engaging part thereof into engagement with the thread of the return feed-shaft, means for holding said member against turning during the return movement of the reproducer-carrier, and means for releasing said member from the holding means at the end of the return movement of the reproducer-carrier to permit said member to be given a further turning movement by the return feed-shaft to return the reproducer to operative position.

12. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble lifting device mounted to turn at substantially right angles to the line of the return feed-shaft, means for causing said device to be given a partial rotation by engagement with the return feed-shaft for lifting the reproducer from the record, means for holding said device in the position to which it has been turned, and means for releasing said device from the holding means to permit said device to be given a further rotation for returning the reproducer to operative position.

13. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble member mounted to move with the reproducer-carrier and having an eccentric or cam periphery and having a thread-engaging part at a high portion of its periphery, means for holding said member in position with a low portion of its periphery toward the return feed-shaft during the reproducing movement of the reproducer-carrier, means for causing said member to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier whereby said member is given a partial rotation to lift the reproducer from the record and to bring its thread-engaging part into engagement with the thread of the return feed-shaft for imparting a return movement to the reproducer-carrier, means for holding said member against turning during the return movement of the reproducer-carrier, and means for releasing said member from the holding means at the end of the return movement of the reproducer-carrier to permit said member to be given a further turning movement by the return feed-shaft for returning the reproducer to operative position.

14. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a cam-disk mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft, said disk having a portion of its periphery of progressively-increasing radius and having a part at a high portion of its periphery formed to coact with the thread of

the return feed-shaft and having a portion of progressively-decreasing radius extending from said thread-coacting portion, means for holding said disk in position with a low portion of its cam periphery toward the return feed-shaft during the reproducing movement of the reproducer-carrier and for holding the disk against rotation during the return movement of the reproducer-carrier, means for causing the disk to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier whereby the disk is given a partial rotation to lift the reproducer from the record and to bring its thread-coacting part into engagement with the thread of the return feed-shaft for imparting a return movement to the reproducer-carrier, and means for releasing the disk from the holding means at the end of the return movement to permit the disk to be given a further rotation by the return feed-shaft for returning the reproducer to operative position.

15. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft having gear-teeth at and near one end thereof, a cam-disk mounted to move with the reproducer-carrier and to turn at substantially right angles to the lines of the return feed-shaft, said disk having a portion of its periphery of progressively-increasing radius provided with gear-teeth to coact with the teeth of the return feed-shaft and having a part beyond the toothed portion formed to coact with the thread of the return feed-shaft and having a portion of progressively-decreasing radius extending from said thread-coacting part, means for holding said disk in position with a low portion of its cam periphery toward the return feed-shaft during the reproducing movement of the reproducer-carrier and for holding the disk against rotation during the return movement of the reproducer-carrier, means for causing the disk to engage the return feed-shaft at the end of the reproducing movement of the reproducer-carrier whereby the disk is given a partial rotation to lift the reproducer from the record and to bring its thread-coacting part into engagement with the thread of the return feed-shaft for imparting return movement to the reproducer-carrier, and means for releasing the disk from the holding means at the end of the return movement to permit the disk to be given a further rotation by the return feed-shaft for returning the reproducer to operative position.

16. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a member mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having a part for engaging the thread of the return feed-shaft to impart a return movement to the reproducer-carrier and to support the reproducer during

its return movement, means for turning said member at the end of the reproducing movement of the reproducer-carrier to lift the reproducer from the record and to bring its thread-engaging part into engagement with the thread of the return feed-shaft and for giving said member a further turning movement at the end of the return movement of the reproducer-carrier for returning the reproducer to operative position.

17. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a cam-disk mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, means for turning said disk to lift the reproducer from the record and to bring its thread-engaging part into engagement with the thread of the return feed-shaft at the end of the reproducing movement of the reproducer-carrier, means for holding said disk against turning during the return movement of the reproducer-carrier, and means for releasing said disk from the holding means at the end of the return movement of the reproducer-carrier to permit the disk to make a further turning movement to return the reproducer to operative position.

18. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a member mounted to move with the reproducer-carrier and to move independently of its movement with the reproducer-carrier in a direction at substantially right angles to the line of the return feed-shaft and having a part for engaging the thread of said shaft to impart a return movement to the reproducer-carrier and to support the reproducer during its return movement, means for moving said member to lift the reproducer from the record at the end of the reproducing movement of the reproducer-carrier and to bring its thread-engaging part into engagement with the thread of the return feed-shaft, means for holding said member during the return movement of the reproducer-carrier, and means for releasing said member from the holding means at the end of the return movement of the reproducer-carrier to permit said member to make a further movement for the return of the reproducer to operative position.

19. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having an eccentric or cam periphery and having a part at a high portion of its cam periphery for engaging the thread of said shaft to impart a re-

turn movement to the reproducer-carrier, means for turning said device to bring successive portions of its cam periphery into supporting engagement with the return feed-shaft to lift the reproducer from the record and to bring the thread-engaging portion thereof into engagement with the thread of the return feed-shaft, means for holding said device against further turning movement during the return movement of the reproducer-carrier, and means for releasing said device from the holding means to permit said device to be given a further turning movement by the return feed-shaft to return the reproducer to operative position.

20. The combination with the reproducer-carrier of a phonograph, of a threaded return feed-shaft, a revoluble lifting device mounted to move with the reproducer-carrier and to turn at substantially right angles to the line of the return feed-shaft and having a part for engaging the thread of said shaft to im-

part a return movement to the reproducer-carrier, means for turning said device to bring successive portions thereof into supporting engagement with the return feed-shaft to lift the reproducer from the record and to bring the thread-engaging part of said device into engagement with the thread of the return feed-shaft, means for holding said device against further turning movement during the return movement of the reproducer-carrier, and means for releasing said device from the holding means to permit said device to be given a further turning movement by the return feed-shaft to return the reproducer to operative position.

Signed by me this 18th day of November, 1903.

WM. W. ROSENFELD.

Witnesses:

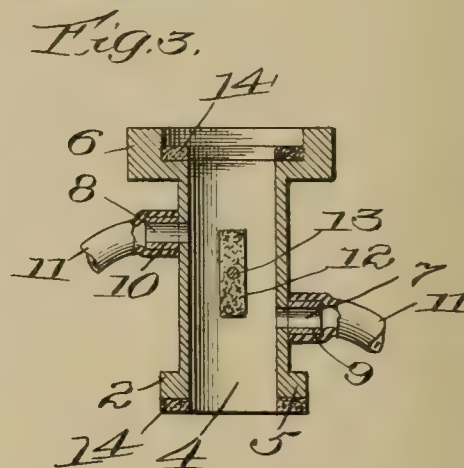
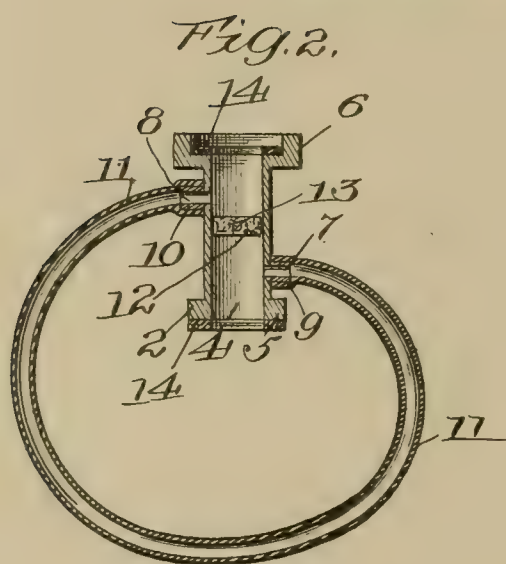
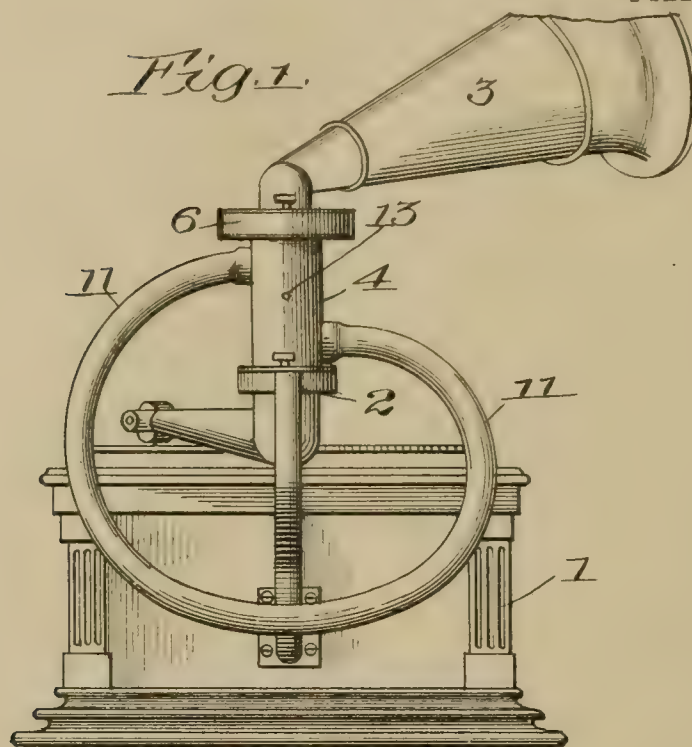
GEO. T. PINCKNEY,
S. T. HAVILAND.

No. 831,900.

PATENTED SEPT. 25, 1906.

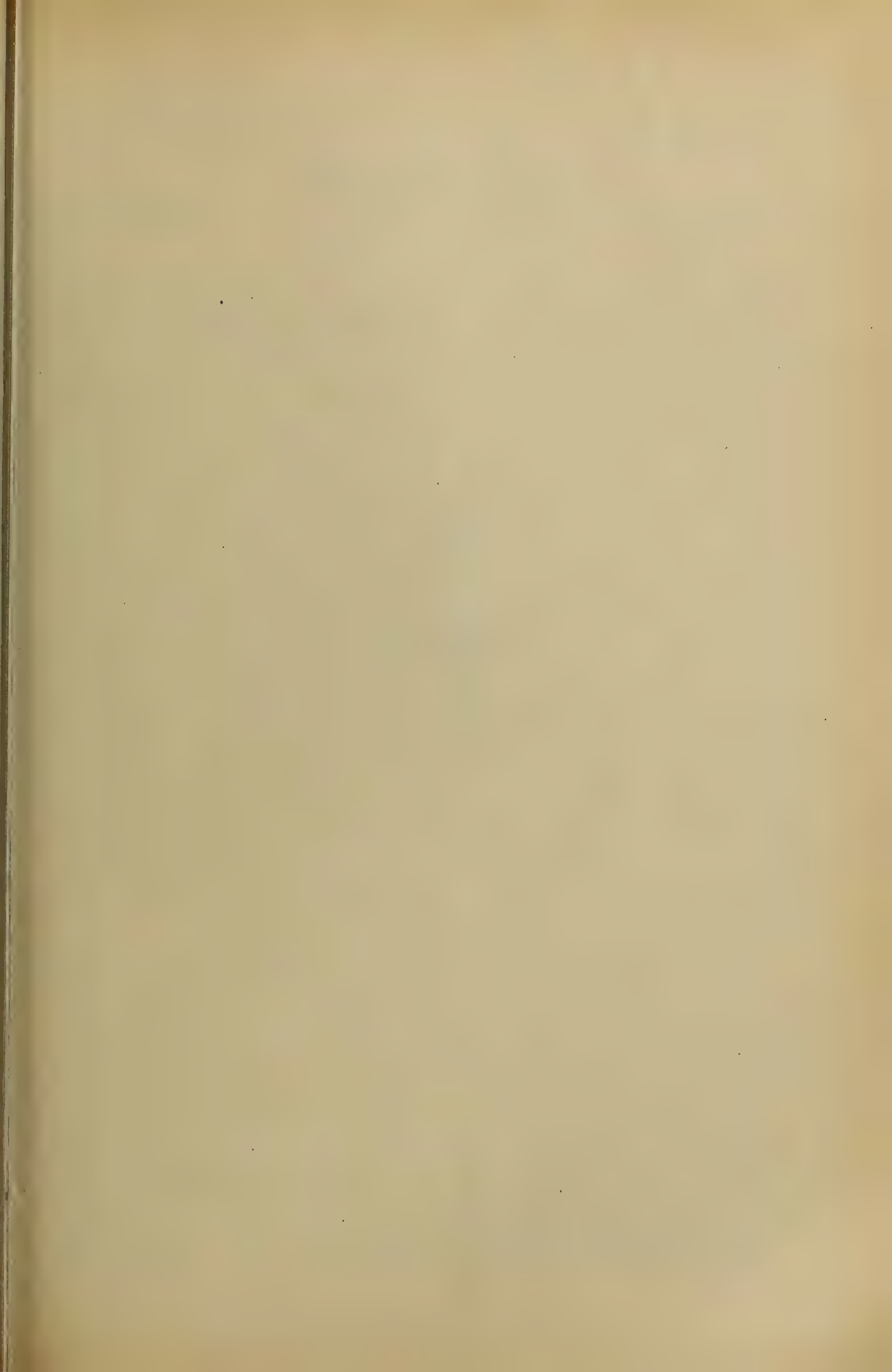
C. A. SMITH.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 5, 1905.

2 SHEETS—SHEET 1.



Witnesses:
O. M. Stennick
Joseph Whitmer

Inventor:
Curtis A. Smith
by Benj. T. Rouchon
Att'y



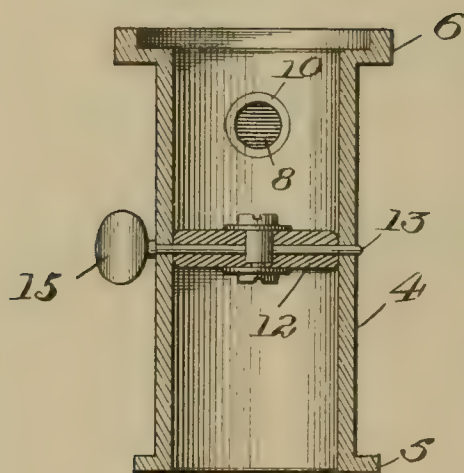
No. 831,900.

PATENTED SEPT. 25, 1906.

C. A. SMITH.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 5, 1905.

2 SHEETS—SHEET 2.

Fig. 4.



Witnesses:
Chas. Hennrich
Chas. Howard

Inventor:
Curtis A. Smith
by *Benj. T. Roodman*
Atty

UNITED STATES PATENT OFFICE.

CURTIS A. SMITH, OF ELGIN, ILLINOIS.

SOUND-REPRODUCING MACHINE.

No. 831,900.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed June 5, 1905. Serial No. 263,686.

To all whom it may concern:

Be it known that I, CURTIS A. SMITH, a citizen of the United States, residing at Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My present invention relates to improvements in sound-reproducing machines, and has special reference to the production of means for modifying the quality of the sound issuing from the sound-ducts to the audience.

Certain sounds are modified to a greater extent than others by modifying the volume of sound issuing from the instrument, and by inserting a mute or stop in the sound-duct high shrill sounds and scratching noises can be eliminated to a great extent. To attain the advantages of this phenomenon in a simple and practical manner my invention consists of a new and novel form and arrangement of sound-duct, as will presently appear.

Figure 1 is a rear elevation of a sound-reproducing machine with my invention as applied thereto. Fig. 2 is a vertical sectional view of my invention. Fig. 3 is a detail view of a part of my invention, showing the position of parts when my invention is thrown out of operation. Fig. 4 is a detail sectional view of the extension-piece with the mute or stop disk in position and the exteriorly-located button for operating same.

In the drawings the numeral 1 is a sound-reproducing machine with the casting 2, to which is usually attached the amplifying-horn 3.

The numeral 4 indicates an extension section or piece, the lower end or bottom 5 of which is made similar to the end of the amplifying-horn, so that it will assemble readily with the casting 2. The upper end 6 of the extension-piece 4 is made similar to the top of the casting 2, so that the amplifying-horn can be attached thereto. In the opposite sides of the extension-piece 4 are provided the apertures or openings 7 and 8, one above the plane of the other, as shown. To the outer surface of the extension-piece 4 and surrounding the apertures 7 and 8 are attached by brazing, soldering, or other appropriate method the small lengths of metallic tubing 9 and 10. Over the outer ends of the short tubes 9 and 10 I pass the opposite ends of the tubing 11. The tubing 11 may be of any appropriate material—such as

rubber, metal, fabric, or a combination of these materials.

Between the planes of the apertures 7 and 8, as specifically referred to in the claims, I provide the mute or stop disk 12, which is carried upon the axle 13. The said axle 13 is at right angles to the direction of the tubes 9 and 10 and has its bearings in the walls of the extension-piece 4. One end of the axle 13 is provided with an exteriorly-located button 15, by means of which the disk 12 may be adjusted transversely to or longitudinally with the axis of the extension-piece 4.

When it is desired to use my device, the disk 12 is adjusted, as shown in Fig. 2, the sound is then compelled to enter the aperture 7, traverse the tubing 11, reënter the extension-piece 4 through the aperture 8, and from thence through the amplifying-horn to the audience.

When it is desired to operate the instrument without my sound-modifier, there is no need to detach it from the instrument. It is only necessary to adjust the disk 12, as shown in Fig. 3, when the sound passes directly through the extension-piece 4 to the amplifying-horn and thence to the audience.

It will be noticed that in Figs. 2 and 3 I show packing-gaskets 14 both at the top and bottom of the extension-piece 4, as I find it is necessary to pack these joints to prevent a murmur of the reproduced sound escaping from these joints.

From the foregoing description, taken in connection with the drawings, it is evident that I provide a means for modifying the reproduced sound which is extremely simple in construction and effective in operation.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a sound-reproducing machine, means for modifying reproduced sound consisting of two sections of sound conduit or conveyer, one of which sections is adapted to modify the sound, and means carried by the other of said sections for directing the reproduced sound through the modifying-section.

2. In combination with a sound-reproducing machine, means for modifying reproduced sound consisting of two sections of sound conduit or conveyer, one of which sections is adapted to modify the sound and adjustable means carried in the other of said sections for directing the reproduced sound through the modifying section.

3. In combination with a sound-reproduc-

ing machine, a cylindrical sound-conveyer with means for locating same between the reproducing means and delivery portion of said machine, said cylindrical sound-conveyer being provided with a length of sound-conveying tubing adapted to modify the sound and adjustable means for directing the reproduced sound through said sound-modifying tubing when desired.

- 10 4. In combination with a sound-reproducing machine, a sound-conveying cylinder provided with two lateral apertures, one located above the other, a length of sound-con-

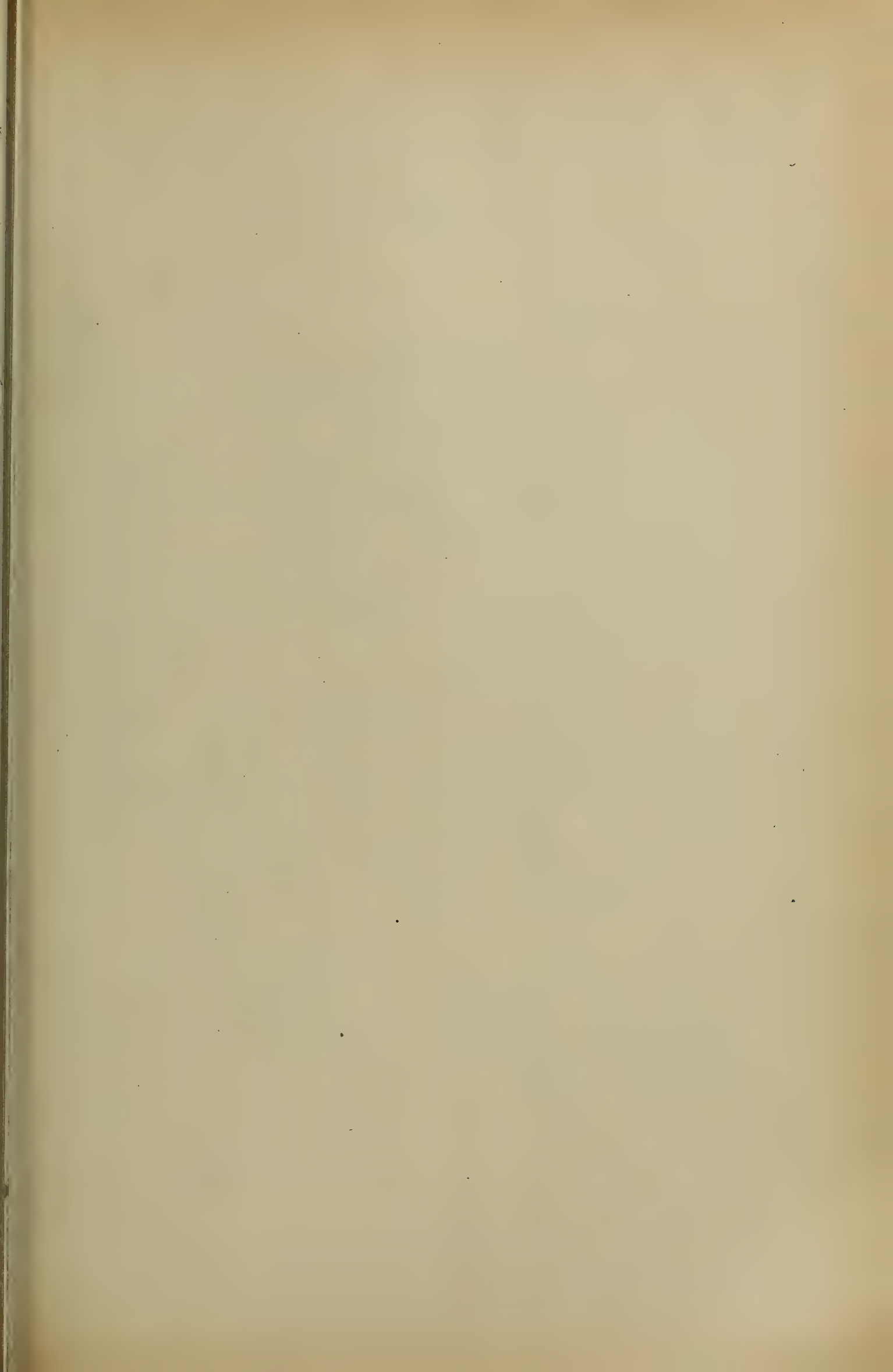
veying tubing connecting said apertures and adjustable means located in said cylinder, which can be adjusted to direct the sound through said sound-conveying tubing, whereby the length of the sound-conduit can be modified, thereby modifying the reproduced sound. 15

In testimony whereof I affix my signature in presence of two witnesses. 20

CURTIS A. SMITH.

Witnesses:

BENJ. T. ROODHOUSE,
BYRON W. WIGHT.



No. 831,987.

PATENTED SEPT. 25, 1906.

H. A. PLACE.
PHONOGRAPH RECORD CLEANER.
APPLICATION FILED NOV. 29, 1905.

Fig. 1.

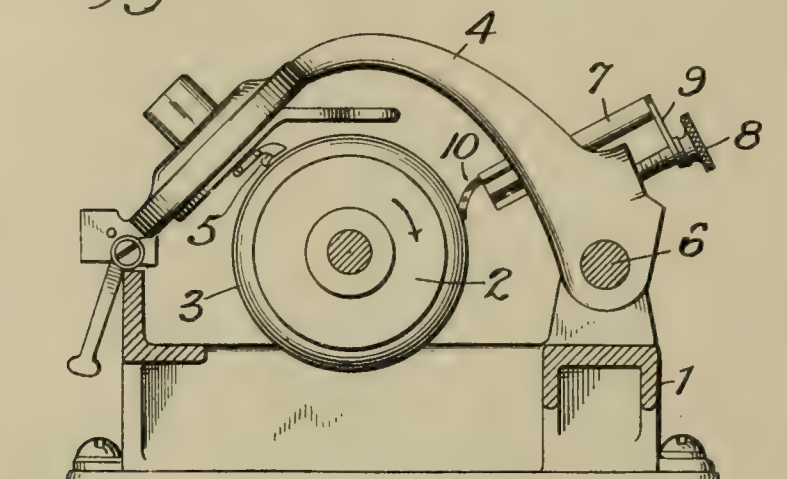


Fig. 2.

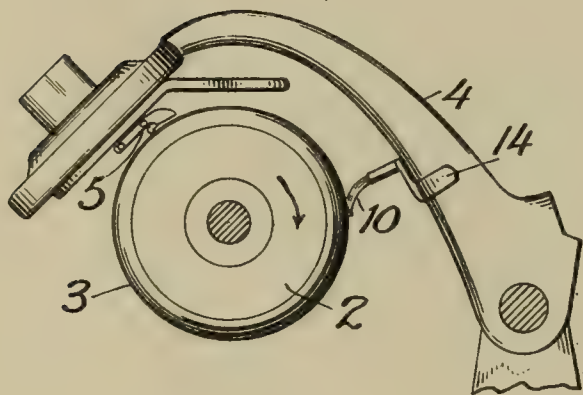


Fig. 3.

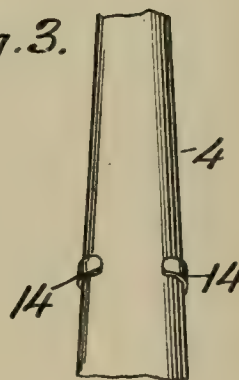


Fig. 4.

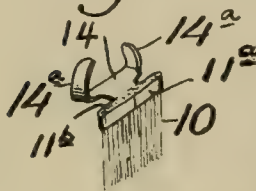


Fig. 5.

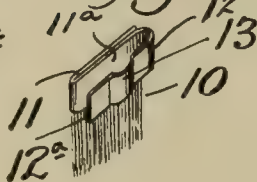
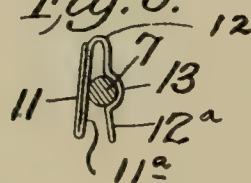


Fig. 6.



Witnesses
James F. Duhamel
Madeleine Michel

Henry A. Place
Inventor

By *his* Attorney
W. H. Crichton-Clark

UNITED STATES PATENT OFFICE.

HENRY A. PLACE, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO
J. NEWCOMB BLACKMAN, OF NEW YORK, N. Y.

PHONOGRAPH-RECORD CLEANER.

No. 831,987.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed November 29, 1905. Serial No. 289,561.

To all whom it may concern:

Be it known that I, HENRY A. PLACE, a citizen of the United States, residing at Providence, in the State of Rhode Island, have invented new and useful Improvements in Attachments for Sound-Reproducing Instruments, of which the following is a specification.

This invention relates to improvements in brush attachments for cleaning phonograph-records, and has for its object to simplify the construction of such brush attachments, so that they may be manufactured easily and economically.

With this object in view the invention resides in a brush attachment for phonographs and the like for cleaning the sound-records thereof possessing the features hereinafter described.

That which is regarded as new will be set forth in the claims.

In the accompanying drawings, illustrating the invention, Figure 1 is a vertical section, partly in elevation, showing a sound-reproducing instrument constructed in accordance with the present invention. Fig. 2 is a similar view showing a modified means of securing the brush in position. Fig. 3 is a detail plan view showing part of the construction illustrated in Fig. 2. Fig. 4 is a perspective view of the brush shown in Figs. 2 and 3. Figs. 5 and 6 are detail views of the brush shown in Fig. 1.

In said drawings, the reference-numeral 1 indicates part of the frame of the sound-reproducing instrument.

2 indicates the mandrel; 3, the record-cylinder mounted on said mandrel; 4, the movable recording-arm which carries the sapphire-point 5; 6, the rod on which the arm 4 slides, and 7 indicates a pin which extends through the movable arm 4 and is adapted to be adjusted toward or from the periphery of the record-cylinder 3 by means of an adjusting-screw 8, which engages or extends through an arm 9 upon the pin 7. The pin 7 is primarily intended to receive on its lower end a small tool for cutting or removing an old sound-wave from the cylinder 3, so as to permit a new record to be placed upon said cylinder.

The parts thus far described are old and well known in the art, for which reason a minute description thereof is deemed to be unnecessary herein.

In the drawings my improved brush attachment for cleaning the record is shown in two forms, the one shown in Figs. 5 and 6 being particularly adapted for connection with the pin 7, hereinbefore referred to, and the other (shown in Figs. 2, 3, and 4) being particularly adapted for connection to the movable sapphire-point-carrying arm 4.

In each form the means for holding the hair or other brush element and the means for attaching such brush element in its intended operative position in the apparatus are constructed of a single integral piece of material. Referring first more particularly to Figs. 5 and 6, this single integral piece of material is fashioned to constitute a ferrule composed of opposed parallel arms 11 11^a, between which the hair 10 or equivalent is disposed and firmly held. When the hair or equivalent is arranged between said arms, it is designed that the arms will be closely pressed together by any suitable means of compression and clasp the hair or equivalent tightly and hold it firmly. From this ferrule the single integral piece of material is continued and fashioned or shaped to constitute the brush-attaching clip in the figures of drawings referred to, being particularly adapted for connection with pin 7. This clip arm or extension is numbered 12 and at its free end 12^a is flared, as shown, to facilitate the application or connection thereof to the pin 7 laterally, the arm 12 springing to permit the pin to pass in between the arm 12 and the ferrule-arm 11^a. Intermediate the ends of arm 12 a socket 13, conforming to the contour of the pin 7, is provided, and when the device is in position the pin 7 seats in this socket and is hugged closely between the arms 11^a and 12, so that the device is supported with a sufficient firmness to accomplish the intended operation thereof. It is obvious in this particular arrangement that the brush may be adjusted to and from the sound-record by adjusting pin 7 through the medium of the screw 8.

Referring now to Figs. 2, 3, and 4, and more particularly to Fig. 4, the attachment is designed for connection with the arm 4 and is constructed of a single integral piece of material fashioned to form arms 11^b and 11^c, said arms together constituting a ferrule in which is disposed the hair or equivalent brush material 10, being held securely therein by subjecting said arms to compression,

pressing them closely about the brush material 10. Intermediate the ends of the arm 11° the piece of material is bent laterally to provide a brace 14, adapted to bear against the under side of the arm 4, as shown in Fig. 2, and at the opposite ends of said brace a spring-clasp is formed consisting of spring-fingers 14^a, adapted to clasp and embrace the arm 4, as seen in Figs. 2 and 3. This device may be readily fitted to the arm, which in the general type of machines now on the market tapers from the sound-box to rear end, by slipping the fingers over the arm at its reduced diameter and sliding same along the arm until the spring-fingers firmly engage the arm, when the device will be held firmly in position to perform its intended function.

Having thus described the invention, what I claim is—

1. A brush attachment for phonographs and the like for cleaning the sound-records thereof, constructed of a single piece of material fashioned with opposed closely-associated arms between which the brush material is confined and securely held, and formed also with a spring-clasp adapted to engage a permanent part of the machine.

2. A brush attachment for phonographs and the like for cleaning the sound-records thereof, constructed of a single integral piece

of material fashioned into opposed closely-associated arms between which the brush material is confined and held, said piece of material being continued in the form of a free spring-arm, the free end of which is flared and provided intermediate its ends with a socket.

3. A brush attachment for phonographs comprising an adjusting screw-rod connected to the recording-arm, and a brush adjustably connected with said rod.

4. A brush attachment for phonographs comprising an adjusting screw-rod connected to the recording-arm, a stem adjustably connected to said rod, and a brush frictionally engaging the lower end of said stem.

5. A brush attachment for phonographs comprising a threaded arm connected with the recording-arm, an arm projecting from the rod and having threaded engagement therewith, a stem depending from said arm, and a brush frictionally engaging the lower end of said stem.

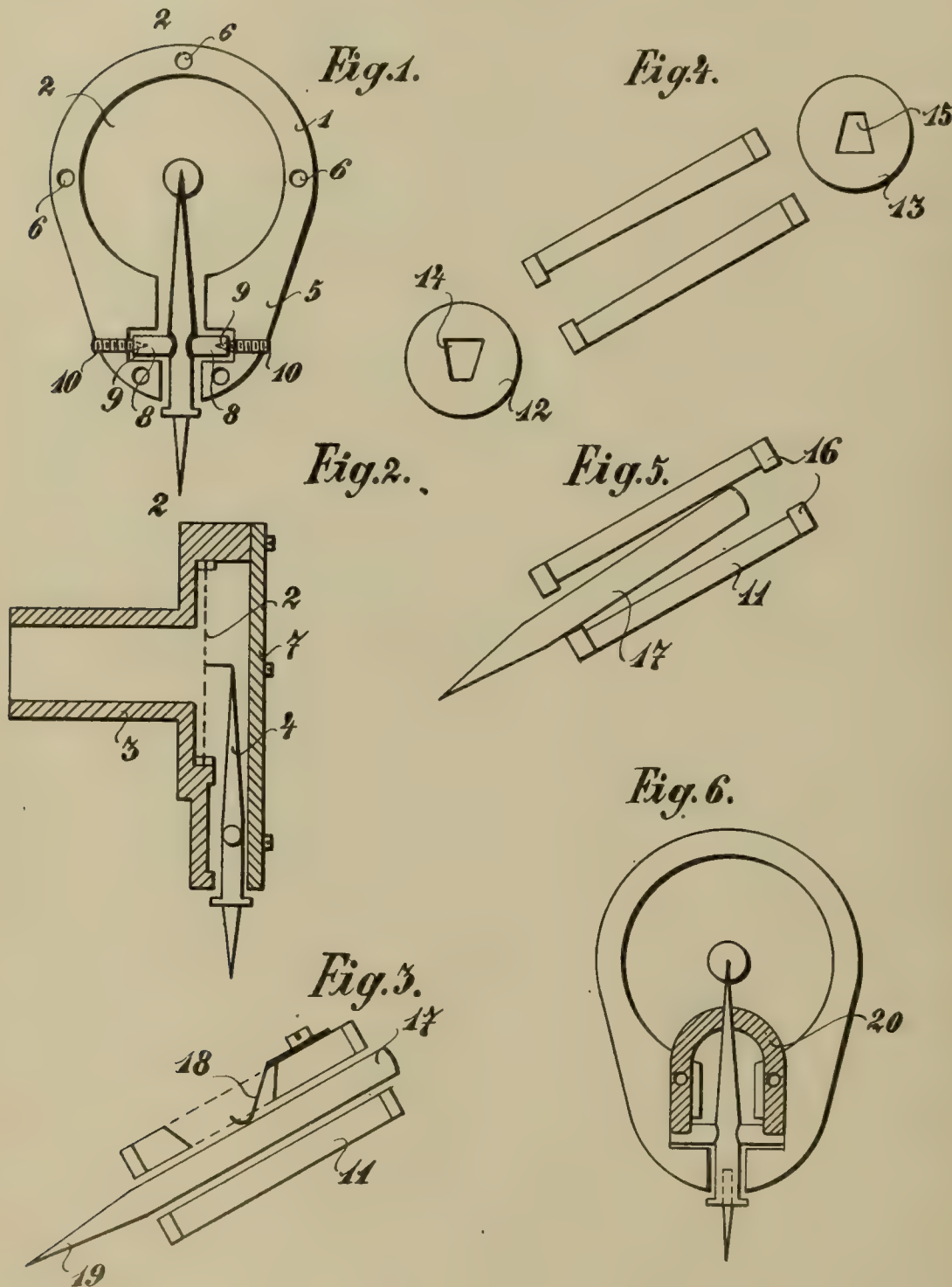
In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY A. PLACE.

Witnesses:

MADELEINE MICHEL,
J. NEWCOMB BLACKMAN.

E. RUNGE.
REPRODUCER FOR TALKING MACHINES.
APPLICATION FILED NOV. 10, 1904.



WITNESSES:

Basil Lange
Carl Thraier

INVENTOR:

Edward Runge

UNITED STATES PATENT OFFICE.

EDUARD RUNGE, OF BERLIN, GERMANY, ASSIGNOR TO JEAN PAUL HENRI DE LA CROIX, OF BERLIN, GERMANY.

REPRODUCER FOR TALKING-MACHINES.

No. 831,995.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed November 10, 1904. Serial No. 232,224.

To all whom it may concern:

Be it known that I, EDUARD RUNGE, manufacturer, a subject of the German Emperor and a resident of 242 Friedrichstrasse, Berlin, in the Kingdom of Prussia, German Empire, have invented a certain new and useful Reproducer for Talking-Machines, of which the following is a specification.

My invention relates to a recorder and reproducer attachment for talking-machines of the usual construction.

One of the objects of the invention is the provision of means for automatically adjusting the style-holder.

A further object of the invention is the provision of means for the reception of the style in the holder and for maintaining the same in a locked position.

Other objects of the invention are the provision of means simple in construction, durable, reliable, and inexpensive in the manufacture.

With these and other objects in view the invention consists in the construction, combination, and arrangement of parts, as will be hereinafter referred to and as illustrated in the accompanying drawings, which disclose the preferred embodiment thereof.

Similar reference characters indicate corresponding parts throughout the several views.

In the drawings, Figure 1 is a front view of the speaking attachment, the cover being removed. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a longitudinal section, drawn to an enlarged scale, of the style guide or socket. Fig. 4 is a like view of a second form of guide having a conical interior. Fig. 5 is a like view of a third form of guide having an internally-projecting top portion. Fig. 6 is a front view of a speaking attachment similar to that shown in Fig. 1, but having a magnet provided.

Referring more particularly to Figs. 1 and 2, the new speaking or reproducing attachment consists of the casing 1, in which the diaphragm 2 is secured, and of the tubular stem or extension 3 at the back of the casing 1. The top of the style-holder 4 is connected in the usual manner with the diaphragm 2. The casing 1, otherwise round, has an enlargement 5 below, and holes 6 are provided to receive the screws which hold the cover 7.

The style-holder is made in one piece and

consists of a cross, the transverse bar 8 of which is mounted on the points 9 of pins 10, screwed into the casing 1. Instead of this arrangement any other suitable means of mounting the bar 8 may naturally be employed. The pins 10, like the bar 8, are of rigid non-resilient material, so that the style-holder 4 has no other motion than the oscillating motion about the axis of the bar 8.

The bottom end of the style-holder is in the form of a cylindrical guide or socket 11, to the ends of which present the actual holding or gripping members 12 13. The latter consist, preferably, as shown, of round disks provided with rhombic apertures 14 15, pierced in reverse directions. In Fig. 3 the inner walls of the socket 11 are parallel to each other, whereas in the socket shown in Fig. 4 the walls are conical, tapering upward, so that projecting portions 16 at the top of the socket, such as are shown in the improperly-constructed socket, Fig. 5, are obviated. The top or rear end of the style or needle 17 is thus prevented from butting against the interior of the socket and taking up an incorrect position. The socket 11 is also provided with a suitable safety-stop or pressing device. This may consist, as shown in Fig. 3, of a spring 18, projecting through the wall of the socket and bearing against the needle 17, so that the latter when once inserted in the socket cannot fall out before the point 19 of the needle is adjusted on the disk of the machine. In place of a mechanical stop device the needle 17 or the socket 11 may be magnetized or be controlled by a magnet. The latter arrangement is shown in Fig. 6, where a magnet 20 acts on the needle 17 and by attraction prevents it from falling out of the socket after being once inserted. After the cover 7 has been screwed on, the whole of the parts are effectually closed in, even in the case of a style-holder of considerable length. There is thus no danger of the device being disturbed by an accidental blow or the like, nor can dust or dirt easily obtain entry.

It must be clearly understood that I do not desire to restrict myself to the precise construction and arrangement of the parts shown, as the details of construction may be greatly varied without departure from the essential features of the invention.

I claim as new —

5 In a reproducer attachment, a casing hav-
ing an elongated reduced extension, a dia-
phragm mounted above the latter and in
said casing, adjustable pins at opposite sides
and arranged transversely in said extension,
a style-holder having a socketed terminal, and
transverse bars intermediate the extremities
thereof, said bars adapted to frictionally en-
10 gage said pins for oscillatory movement of

the holder in a direction at right angles to its
axial line, a style mounted in the socket, and
means for retaining the style in the socket.

In witness whereof I have hereunto signed
my name, this 22d day of October, 1904, in 15
the presence of two subscribing witnesses.

EDUARD RUNGE.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

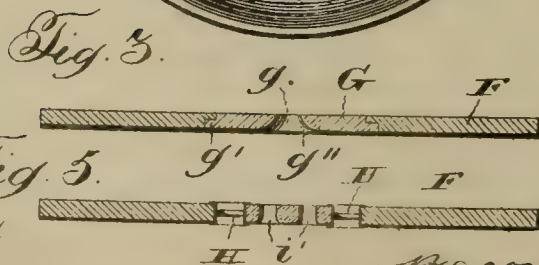
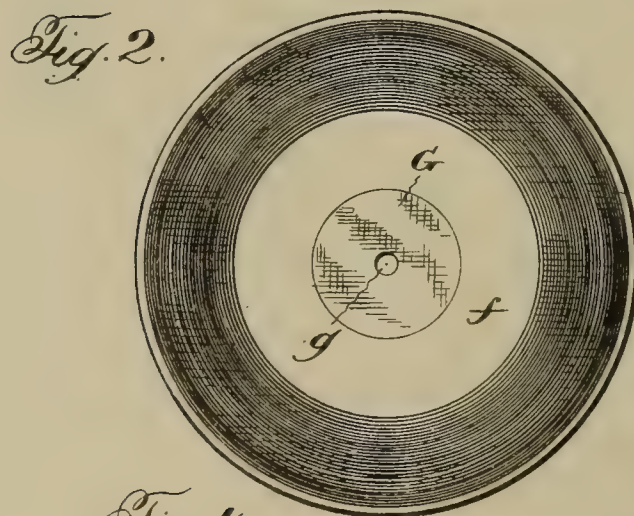
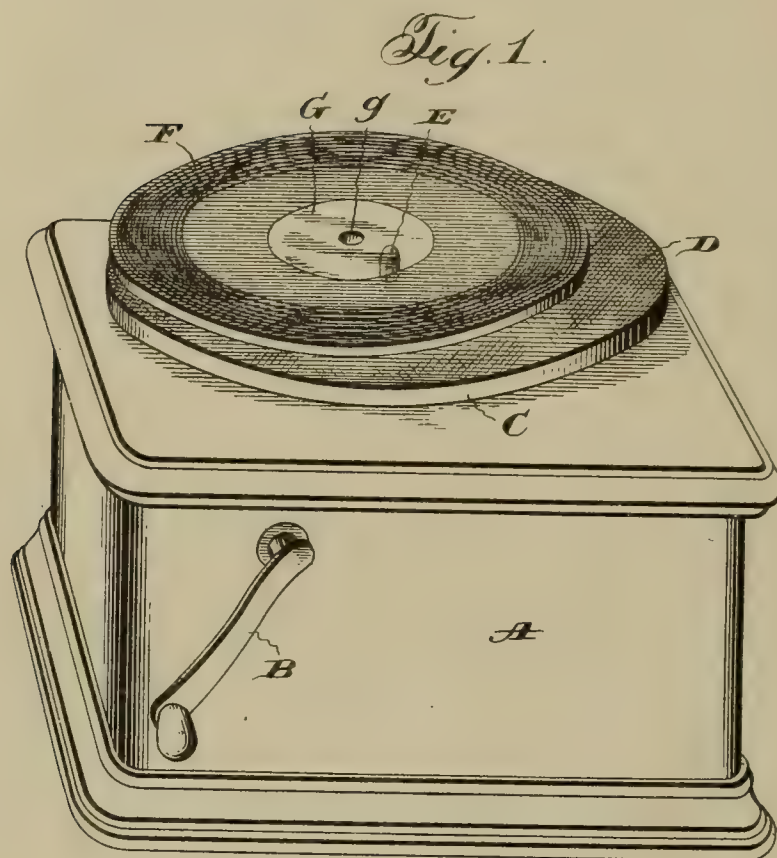
No. 832,403.

PATENTED OCT. 2, 1906.

J. H. MILANS.
SOUND REPRODUCING DISK RECORD.

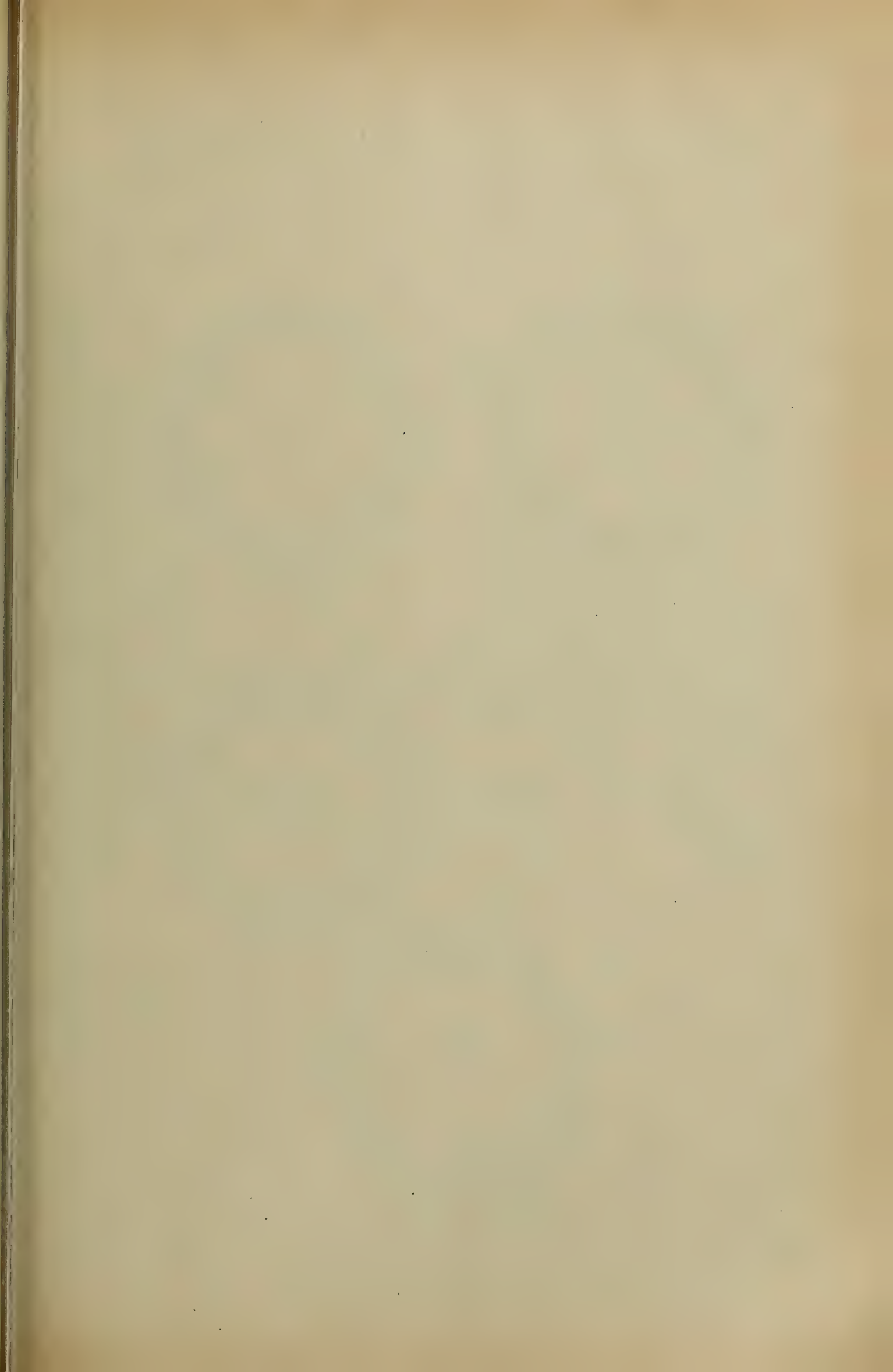
APPLICATION FILED APR. 21, 1906.

2 SHEETS—SHEET 1.



Witnesses:
Jas. Hutchinson.
John T. Milans.

Inventor:
J. H. Milans,
by Bacon & Milans
Attorneys.



J. H. MILANS.
SOUND REPRODUCING DISK RECORD.

APPLICATION FILED APR. 21, 1905.

2 SHEETS—SHEET 2.

Fig. 8.

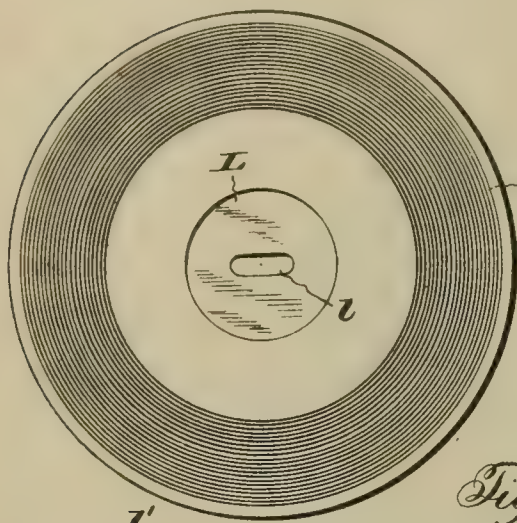


Fig. 10.

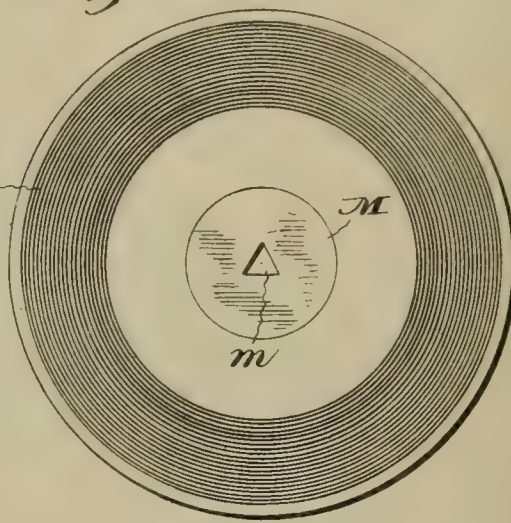


Fig. 9.

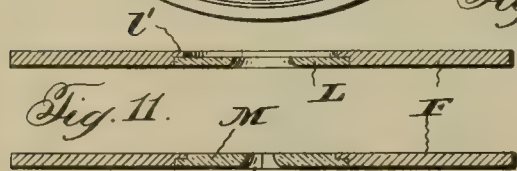


Fig. 4.

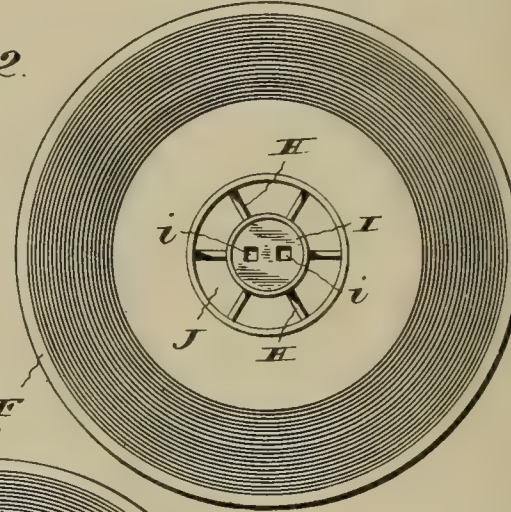


Fig. 11.

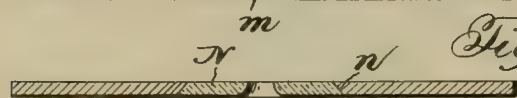


Fig. 12.

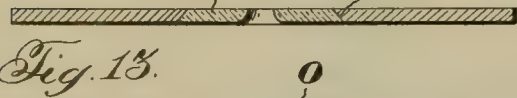


Fig. 13.



Fig. 14.



Fig. 15.

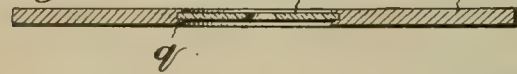


Fig. 6.

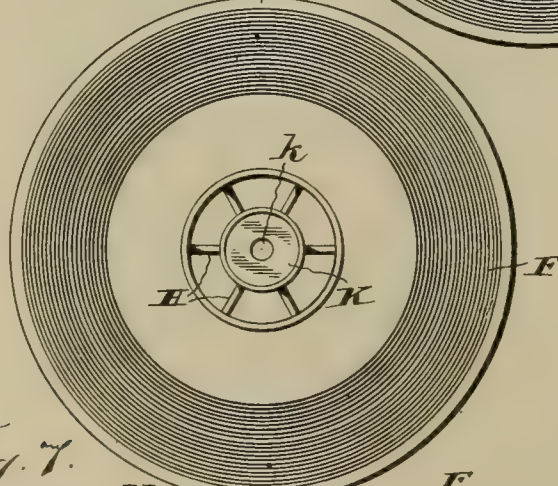
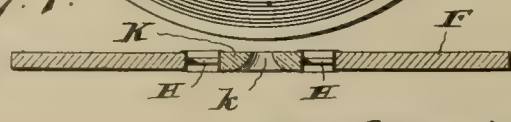


Fig. 7.



Witnesses
Jas. C. Hutchinson
Cabin T. Milans.

Inventor

J. H. Milans,

by Macmillan & Milans Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH H. MILANS, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND-REPRODUCING DISK RECORD.

No. 832,403.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed April 21, 1905. Serial No. 256,698.

To all whom it may concern:

Be it known that I, JOSEPH H. MILANS, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Sound-Reproducing Disk Records, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in sound-reproducing disk records, and has for its primary object to overcome the disadvantages inherent in the hit-and-miss idea involved in the manual application of opaque
15 disks of the character designated to a centering-pin or equivalent device carried by the rotating platform or record-support now universally employed in talking-machine structures and the like.

20 Abundant experience has emphatically demonstrated that quite a perceptible and irksome inconvenience is encountered in the use of the opaque disks having but a small opening or aperture in its center formed complementary to and designed to snugly fit the
25 centering-pin before referred to, owing to the fact that said pin is entirely obscured by the body of the disk, and although of course said aperture occasionally receives said pin immediately upon application of the disk it is more
30 frequently the case that the base of the disk strikes the head of the pin anywhere approximating the center of the former, with the resultant necessity of shifting the disk back
35 and forth in various directions through the medium of the hands of the operator until the aperture more or less by chance is brought into registration with the pin and the disk
40 lowered upon the platform and centered by said pin preparatory to the engagement of the reproducer therewith. Aside from this annoyance, which obviously is the most striking objection to disks of the type just
45 mentioned, it is also to be observed that in the course of an evening or similar period of time when a large number of records are played, and more especially in sales departments or places of public amusement where records are constantly exhibited, quite a little
50 time in the aggregate is consumed and lost owing to the absence of provision enabling immediate application of the disk to the centering-pin.

As stated, it is with a view to overcome all
55 of the foregoing disadvantages afforded by

disks of the prior art that the present invention has been devised, and in its generic sense the improvements reside in the provision of instrumentalities facilitating the manual application of a normally free sound-reproducing disk record, the main body of which is opaque, to the centering device or devices on the rotary platform or disk-support, it being noted that by the term "normally free" I intend to differentiate disks applied and removed by the hands of the operator in contradistinction to such disks as are used in magazine-machines and the like and shifted by the mechanism thereof from an inactive to an active position, or vice versa.

More specifically, the invention comprehends a disk having an opaque body portion and a centrally-disposed sight-opening or window, which may be in the nature of an open space or transparent disk, or both, through which the centering pin or device may be clearly seen by the operator from above the record, said transparent disk or open space, or both, as the case may be, immediately surrounding an opening or openings formed to correspond with and receive the centering device or devices on the record support or platform, a highly important advantage gained by the formation of a disk record of this type, due to the provisions enabling relatively constant observation of the centering device from above the record, being that said devices may be of non-circular or angular contour or separated and the receiving portions of the disk formed complementary thereto, whereby when they are brought into operative relation a positive drive of the record may be effected as compared with the friction-drive in machines now on the market, thus permitting me to dispense with felt or other frictional engaging surfaces usually carried upon the upper face of the record-supporting frame or platform.

To perhaps more readily impart a clear and full understanding of the invention, I have illustrated in the accompanying drawings, forming part hereof, a number of embodiments of the invention, and the novel details in the construction and arrangement of the several parts thereof will be apparent upon an inspection of said drawings in connection with the detailed description herein-after contained.

In the drawings, Figure 1 is a perspective view, somewhat fragmentary, of an ordinary

graphophone, showing the manner of applying one of my improved disks thereto, the body of the disk being opaque and the centering portion thereof transparent and apertured, the centering-pin on the platform adapted to enter the aperture showing through said transparent portion. Fig. 2 is a face view of the disk record of Fig. 1. Fig. 3 is a central transverse sectional view through Fig. 2. Fig. 4 is a face view of a record constituting another embodiment of the invention, and this particular form, for the purposes of the present application, I will style my "preferred" embodiment of the invention. Fig. 5 is a central transverse sectional view through Fig. 4. Figs. 6 and 7 are views similar to Figs. 4 and 5 of a third embodiment of the invention. Figs. 8 and 9 and Figs. 10 and 11 are similar views of still further embodiments of the invention, and Figs. 12, 13, 14, and 15 are detail sectional views illustrative of different ways of securing the transparent disks or windows to the opaque record-disks.

Referring now more particularly to the drawings, in the several series of views of which like reference characters designate like features, and first with reference to Figs. 1, 2, and 3, A designates the body or box portion of the graphophone; B, the crank for winding the motor therewithin; C, the rotatable record support or platform actuated by the motor; D, the usual felt or other frictional material secured to the upper face of said platform or support, and E represents the centering-pin adapted to engage an aperture in the record-disk to hold the same in proper position relative to and while engaged by the reproducer, (it being unnecessary to show or further refer to the latter herein.) F is a sound-reproducing disk record of the usual character having a main body portion of opaque material, in the upper surface of which is provided the customary record comprising a spiral groove possessing a sinuous surface in accordance with the sounds desired to be reproduced incident to the rotation of the record and the engagement of the reproducer-diaphragm vibrating pin with the groove. Within these disks there is always a centrally-disposed part *f*, upon which a trade-name or title-bearing label is usually affixed. In keeping with my invention I utilize a part or all of this central portion for a sight-opening or window G, the latter being of transparent material, such as glass, celluloid, or the like. This window has an aperture *g* for the reception of the centering-pin E and in this form is secured to the disk F through the medium of cemented interfitting flanges *g'* at the adjoining edges thereof. Preferably the lower surface of the window is flush with the bottom of the record-disk, so that the same may freely slide or shift over the centering-pin E, and

the aperture *g* is rounded or flared downwardly, as at *g''*, to guide the centering-pin into its proper place. It will be seen that the flange on the periphery of the window underlies the flange of the record-disk, so that in the application of the record to a machine the tendency is always to keep the window in place rather than loosen it. In applying the disk it is invariably the case that the central or windowed portion thereof will be approximately centralized relative to the centering-pin, and such being the case the pin E will at once be seen therethrough and its actual position positively located, Fig. 1, and it is simply necessary for the user to shift the aperture *g* over the disk and permit the record to fall into engagement with the platform D.

Referring now to the embodiment illustrated in Figs. 4 and 5, it will be seen that the central portion of the record and in a suitable opening therewithin a spider H, preferably of metal, is secured, said spider in turn carrying a transparent disk I, provided with separated angular apertures *i*, designed to engage correspondingly shaped and separated pins of a record support or platform, the lower ends of the apertures being rounded or flared, as at *i'*, Fig. 5. By this particular arrangement an enlarged open space J is left around the window I, through which, as also through the window, the centering devices may be seen, as is obvious. The angularity of the pin-receiving recesses affords a flat steady engagement between the record and its support, and this, together with their separated arrangement, secures a positive drive for the disk when placed in operative position upon a machine.

The form shown in Figs. 6 and 7 is in all respects like that last considered, save that a single rounded aperture *k* is formed in the transparent disk or window K in the spider.

In Figs. 8 and 9 a form of record is disclosed in which the transparent inner disk or window L is of uniform thickness throughout and secured against an overhanging annular shoulder *l'* of the record proper. The opening for the centering device in this particular instance (designated at *l*) is oblong and rounded at its ends as well as downwardly flaring, which also insures a positive drive.

The window M of Figs. 10 and 11 is secured to the record after the same manner as that of the form illustrated in Figs. 1, 2, and 3, the difference between these two embodiments being in the shape of the receiving-aperture for the centering-pin, which in the present instance is triangular, as seen at *m*, and downwardly flaring, as in those previously pointed out.

The remaining figures—*i. e.*, 12, 13, 14, and 15—are added to further disclose ways of securing the windows to the disks. In the first-named figure the edges *n* of the window

N are beveled in a downward and outward direction to engage a corresponding undercut edge of the record. In Figs. 13 and 14, in which the windows are respectively designated O and P, the record is shown as molded directly around said windows, the two being held together through the medium of different types of tongue-and-groove interfittings *o p*. In Fig. 15 the window Q is of uniform thickness throughout, and the edge of the record bordering the central opening thereof is molded around the peripheral portion of said window (indicated at *q*.)

It is to be remembered that in all of the embodiments illustrated in the last four figures the transparent central portions are suitably apertured and tapered for the guidance and reception of centering-pins or the like, and, further, that the record proper of these, as also of the other figures in the case, is opaque.

From the disclosures made herein it is apparent that the invention is susceptible of still other embodiments than those illustrated and also that alterations and changes in the structural details set forth may be made without departing from the spirit of the invention. For example, the transparent disks or windows and sight-openings have in each instance herein been illustrated as circular, because it is believed that this is probably the most expedient and practical formation thereof; but it is obvious that the contour may be changed as desired.

Hereinafter in the hereto-appended claims I will refer to "sight-openings," meaning thereby either the transparent window or disk or the unobstructed space, through either of which the centering-pin may be seen; also, where I refer to "centering" device or pin it is by no means with the intention that this definition refers to the location of the device or pin, but rather the function thereof—*i. e.*, to fix or hold the record in a prearranged and proper relation to the reproducing mechanism.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, the apertured portion being adjoined by a sight-opening.

2. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, the apertured portion being substantially surrounded by a sight-opening.

3. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, and provided with a transparent window adjoining said aperture.

4. As an article of manufacture, a sound-

reproducing record-disk having an opaque body and also having an aperture for a centering-pin, and provided with a transparent window surrounding said aperture.

5. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, and provided with a transparent window adjoining said aperture, said window being carried by the disk and bordered by an open space therebetween.

6. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, and provided with a transparent window surrounding said aperture, said window being carried by the disk and surrounded by an open space therebetween.

7. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, the apertured portion being surrounded by an open space through which the pin may be observed.

8. As an article of manufacture, a sound-reproducing record-disk having an opaque body and also having an aperture for a centering-pin, the apertured portion having an open space through which the pin may be observed.

9. As an article of manufacture, a sound-reproducing record-disk, having an opaque body, and provisions for engagement with a centering device, in combination with further provision whereby said device may be observed through the disk.

10. As an article of manufacture, a sound-reproducing record-disk having an opaque body, and a portion adapted to cooperate with a centering device, said cooperating portion being adjoined by a sight-opening.

11. As an article of manufacture, a sound-reproducing record-disk having an opaque body, and a portion adapted to cooperate with a centering device, said cooperating portion being substantially surrounded by a sight-opening.

12. As an article of manufacture, a sound-reproducing record-disk having an opaque body and a separate transparent portion carried thereby formed to cooperate with a centering device.

13. As an article of manufacture, a sound-reproducing record-disk comprising an opaque body having a part of its interior cut away, and a separate transparent portion inserted therein and carried thereby formed to cooperate with a centering device.

14. As an article of manufacture, a sound-reproducing record-disk comprising an opaque body having a part of its interior cut away, and a separate transparent portion inserted therein and carried thereby formed to cooperate with a centering device, said opaque body having an edge overlapping a

complementary edge carried by the opaque body to secure the parts in place.

15 15. As an article of manufacture, a sound-reproducing record-disk comprising an opaque body having a part of its interior cut away, a separate transparent portion inserted therein and carried thereby formed to co-operate with a centering device, said opaque body having an edge overlapping a complementary edge carried by the opaque body to secure the parts in place, and the latter edge being uppermost to oppose the tendency of the insert to loosen and separate during the application of the disk to its support.

15 16. As an article of manufacture, a sound-reproducing record-disk having its interior of open-work formation.

20 17. As an article of manufacture, a sound-reproducing record-disk having its interior of open-work formation, said open-work

formation having a part for engagement with a centering device.

18. As an article of manufacture, a sound-reproducing record-disk having its interior of open-work formation, said open-work formation having an apertured disk part for engagement with a centering device. 25

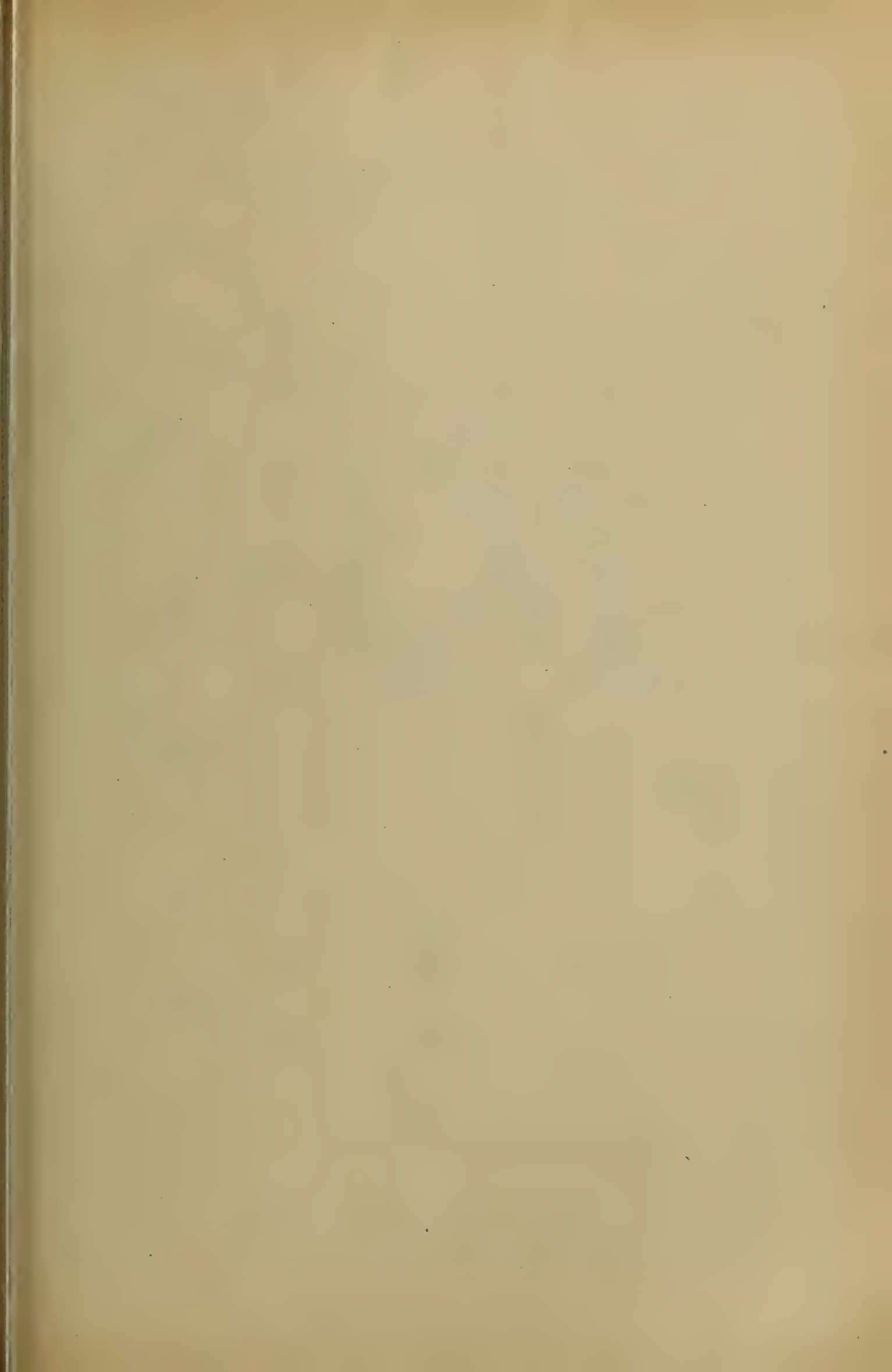
19. As an article of manufacture, a sound-reproducing disk record having a main body portion, a transparent portion apertured for engagement with a centering device, and a spider intermediate of and engaging said main body portion and the transparent portion to hold them in operative relation. 30

In testimony whereof I affix my signature in presence of two witnesses. 35

JOSEPH H. MILANS.

Witnesses:

J. PERCY CAMPBELL,
K. E. MONTAGUE.



No. 832,249.

PATENTED OCT. 2, 1906.

F. E. FORSELL.
PHONOGRAPH RECORD CLEANER.
APPLICATION FILED APR. 11, 1906.

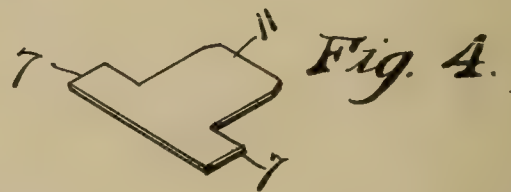
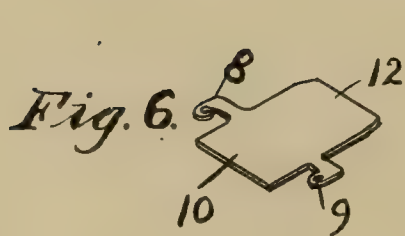
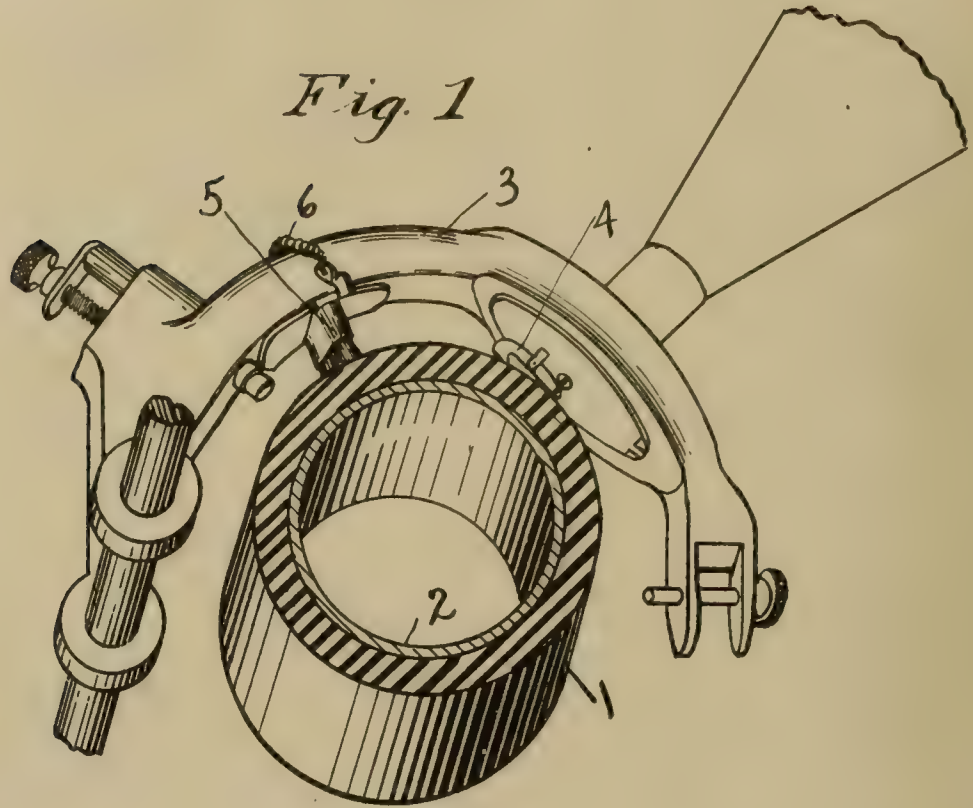


Fig. 3.

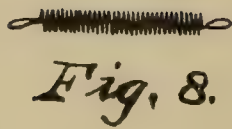


Fig. 5.

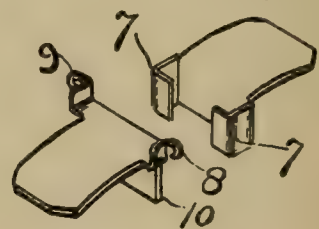


Fig. 7.

Fig. 2.



Inventor

Frans E. Forsell.

Witnesses

Frank A. Foster

E. D. Ogden

By

Howard E. Barlow

Attorney

UNITED STATES PATENT OFFICE.

FRANS E. FORSELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO
J. NEWCOMB BLACKMAN, OF NEW YORK, N. Y.

PHONOGRAPH-RECORD CLEANER.

No. 832,249.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed April 11, 1905. Serial No. 254,985.

To all whom it may concern:

Be it known that I, FRANS E. FORSELL, a citizen of the United States, residing at 379 Weybosset street, Providence, in the county
5 of Providence and State of Rhode Island, have invented certain new and useful Improvements in Phonograph-Record Cleaners, of which the following is a specification, reference being had therein to the accompanying
10 drawings.

This invention relates to an attachment for cleaning the record-roll on a phonograph, and has for its object to provide a brush or other suitable device to be preferably sus-
15 pended from the traveling arm that carries the reproducing-point.

It is found in practice that when a record-roll collects dust said dust is apt to lodge in the little recording-grooves on the face of the
20 roll, and if it is not thoroughly removed before the record is used this dust and grit comes in contact with the sharp point or edge of the reproducing-needle and wears the same off and quickly destroys it. To obviate this difficulty, I have provided a little
25 brush which may be made of hair, felt, or other soft or suitable flexible material and suspend the same from the reproducer-arm. This brush is arranged to come in direct contact with the revolving roll, completely removing all of the dust and grit from the
30 grooves before they come in contact with the point of the said reproducing-needle, thus enabling said needle to transmit a sharper and clearer reproduction, and at the same
35 time the life and efficiency of the said reproducing-points are greatly increased.

The invention is fully set forth in this specification and more particularly pointed out in
40 the appended claims.

In the accompanying drawings, Figure 1 is a perspective view showing a portion of the recording-roll, the reproducing-arm, and the cleaning-brush in position on said arm. Fig.
45 2 is an enlarged perspective view of the brush detached. Fig. 3 is the said brush in elevation. Fig. 4 is the shape of one of the pieces of the brush-frame as it is struck from the sheet stock. Fig. 5 represents the piece
50 shown in Fig. 4 bent in position to receive the bristles or felt from which the brush may be made. Fig. 6 shows the shape of the blank of the second member of the brush-frame. Fig. 7 shows said second blank with the lip

bent down and the hook and eye bent up in
position. Fig. 8 shows a detail of the little flexible coil-spring by which said brush is attached to the arm.

Referring to the drawings, at 1 is the record-roll, mounted in the usual way on the cylinder 2, and is caused to rotate by a spring, motor, or other suitable means. (Not shown.) At 3 is the usual arm that carries the reproducing-point 4, which point engages the cylinder in the usual way to reproduce
60 the sound therefrom. This arm 3 traverses the face of the said cylinder and moves at a speed in proportion to the rotation of the same and is propelled by the usual means for moving said arm. (Not shown.)
70

At 5 is the brush, shown in Fig. 1 as being located on the under side of the arm 3 and attached thereto by a flexible connection 6. This brush may be constructed in any convenient manner and of any suitable material,
75 such as soft hair, felt, or other soft or flexible material.

The ferrule for holding the hair or brush portion together in a bunch may be made in many ways; but I prefer to construct the
80 same by cutting a blank from sheet stock, with ears 7 7, as shown in Fig. 4, and then bend these ears down and around, as shown in Fig. 5. A second blank is then struck from sheet stock, having a projection 8 on
85 one side thereof terminating in a hook and a second projection 9 on the opposite side provided with an eye, as shown in Fig. 6. The lip 10 of this member is then turned down and the projecting members 8 and 9 turned
90 up into the position shown in Fig. 7. The lip 10 is then placed between the ears 7 7, and the ferrule or band to receive and retain the brush material is completed. It then remains to place one end of this brush material
95 into this ferrule and set the same firmly together in a press or by other means to bind the material, and the brush is completed. The ends 11 and 12 of the members form a saddle to engage the under side of the arm 3
100 and present a good broad bearing-surface to support the brush thereon, while the projections 8 and 9 embrace arm 3 to prevent lateral movement of the brush. In attaching this device to the said arm any means may
105 be used; but I preferably employ the use of a fine flexible coil-spring 6, one end of which is fastened to the eye on projection 9, the oppo-

site end of said spring having a hook or eye that may be carried over the said arm and hooked into the hook on projection 8. If it is not convenient to use a spring for this purpose, a rubber band or other flexible means may be used.

This brush may also be attached to phonographs using the disk-records to clean the same in somewhat the same manner as it is applied to the cylinder-machines.

This practical device is very inexpensive. It may be readily attached to any phonograph and is very efficient in cleaning the record, and thus prolongs the life of the point of the reproducing-needle and increases the efficiency of the same.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A device of the character described comprising a clip or ferrule having a brush secured therein and provided with an angular extension formed in one piece with one wall of said clip or ferrule and forming a saddle-piece, said saddle-piece being provided with oppositely-disposed projections adapted to embrace a support.

2. A device of the character described comprising a clip or ferrule having a brush secured therein and provided with an angular extension formed in one piece with one wall of said clip or ferrule and forming a saddle-piece, said saddle-piece being provided with oppositely-disposed laterally-arranged upturned projections adapted to embrace a support.

3. A device of the character described comprising a clip or ferrule having a brush secured therein and provided with a plate having opposite laterally-arranged upturned projections adapted to embrace a support.

4. The combination with a movable member of a sound-reproducing instrument of a clip or ferrule having a brush secured therein and provided with oppositely-disposed projections for embracing said movable member.

5. The combination with a movable member of a sound-reproducing instrument, of a brush provided with a saddle, and a resilient member adapted to hold said saddle against the under side of said movable member.

6. The combination with a movable member of a sound-reproducing instrument, of a clip formed of two members each having extensions forming a saddle, a brush secured in said clip, and means for securing said clip to said movable member.

7. The combination with a movable member of a sound-reproducing instrument, of a clip formed of two members each having extensions forming a saddle, a brush secured to said clip, and a resilient member for securing said clip to said movable member.

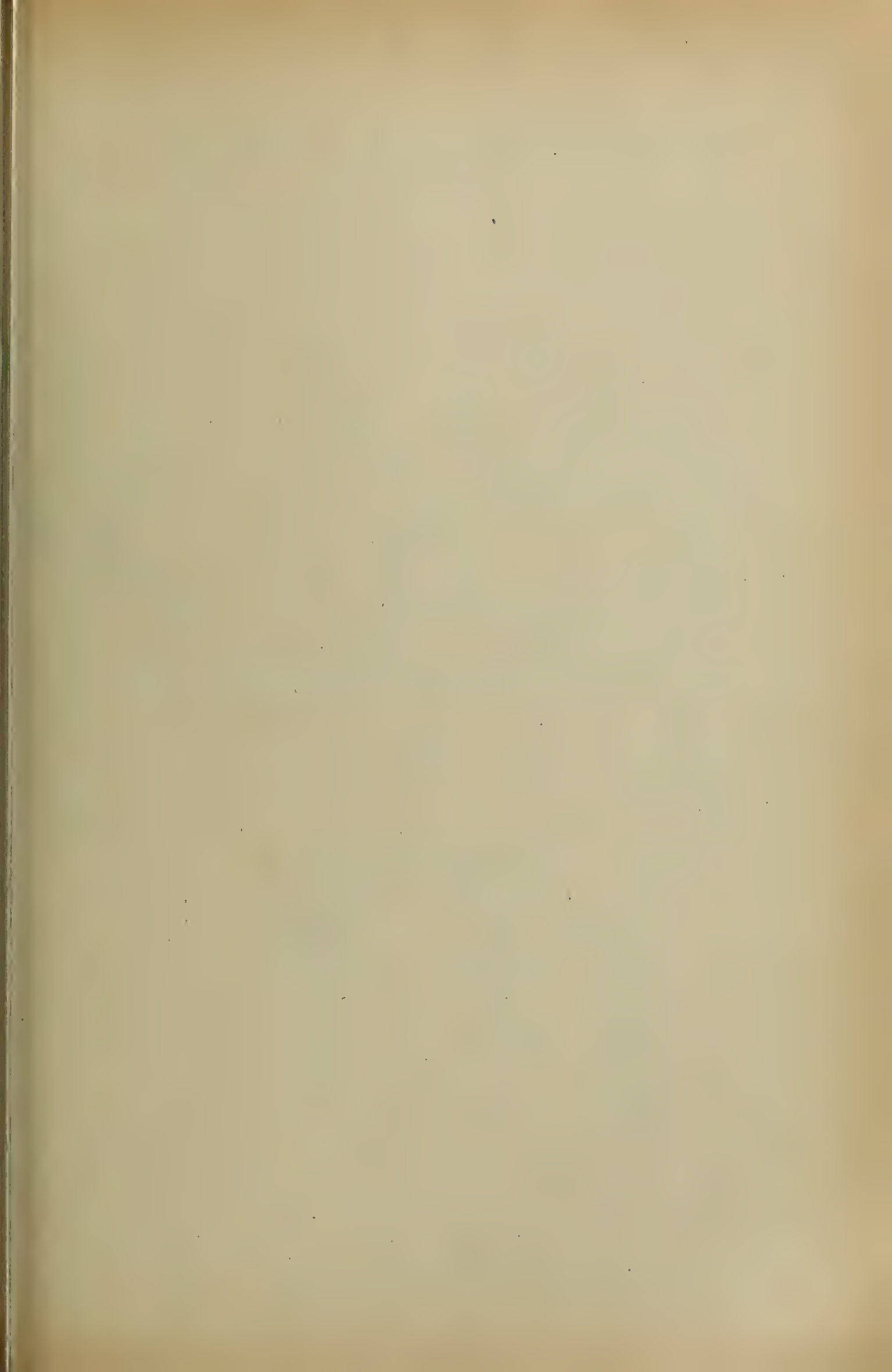
8. In a cleaning device for phonograph-records, the combination of a phonograph-record roll, a reproducing-point, a traversing arm for carrying said point, a brush located in the path of said point to engage said roll and clean the same, said brush being located on the under side of said arm, a saddle on said brush for supporting it against said arm, a hook and an eye on said saddle, a flexible connector passed over said arm and engaging said hook and eye for holding said brush in position on said arm.

In testimony whereof I affix my signature in presence of two witnesses.

FRANS E. FORSELL.

Witnesses:

HOWARD E. BARLOW.
E. I. OGDEN.



No. 832,703.

PATENTED OCT. 9, 1906.

E. SOLLORS.
PHONOGRAPH.

APPLICATION FILED JULY 26, 1904.

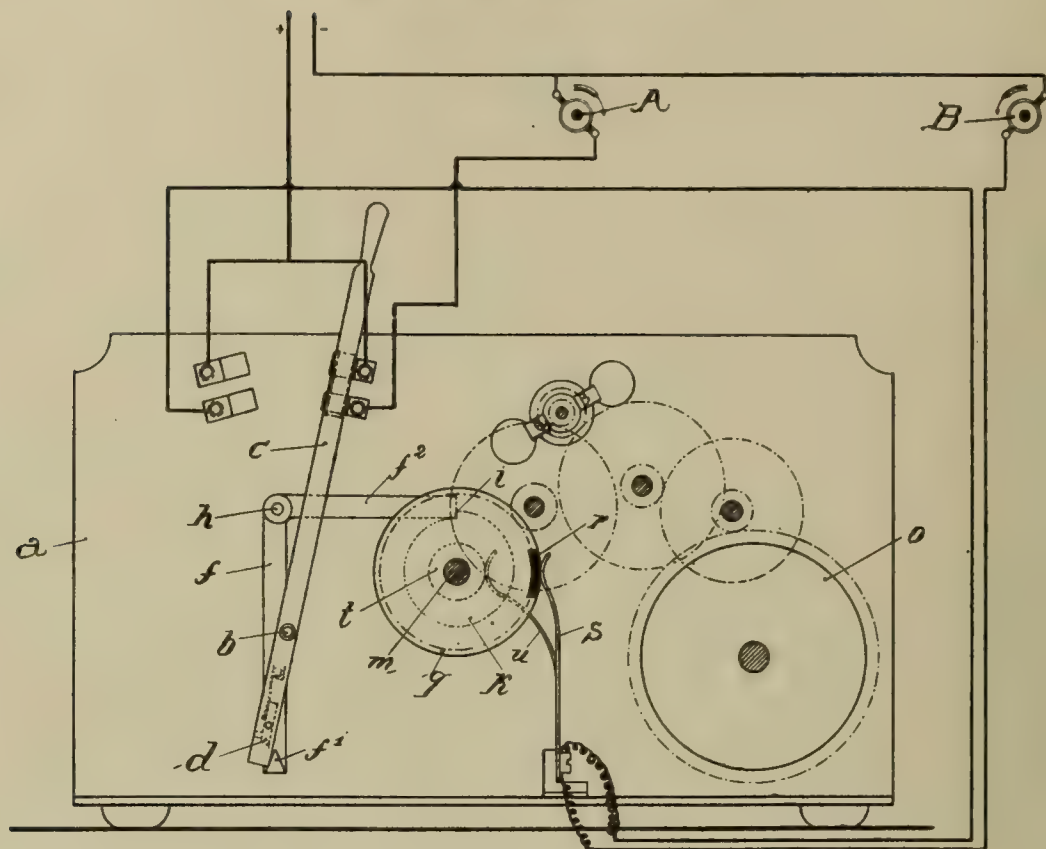


Fig. 1.

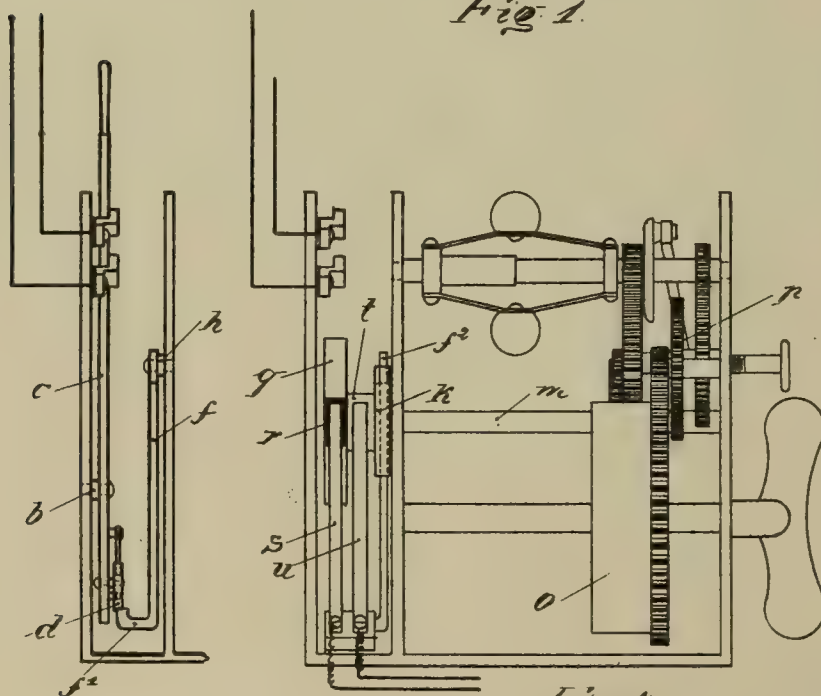


Fig. 2.

Fig. 3.

Witness
A. Manning
B. Penabaker.

Inventor
Ernest Sollors.
By Knight Bros
attys.

UNITED STATES PATENT OFFICE.

ERNST SOLLORS, OF COLOGNE, GERMANY.

PHONOGRAPH.

No. 832,703.

Specification of Letters Patent.

Patented Oct. 9, 1906.

Application filed July 26, 1904. Serial No. 218,239.

To all whom it may concern:

Be it known that I, ERNST SOLLORS, merchant, a subject of the King of Prussia, German Emperor, residing at Hohenzollernring 67, Cologne, Germany, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description.

The present invention relates to an adjusting device for phonographs.

In phonographs, especially such as are employed for purposes of dictation, a great drawback is found to be in that when the phonograph is started or stopped the machine is not immediately connected or disconnected. The phonograph will, moreover, invariably at the moment of the disconnecting make a little further forward motion, and in like manner when it is started again there will be necessary a certain movement of the phonograph before it again possesses the speed at which the sounds through the trumpet are clearly audible. Obviously this is a very disagreeable occurrence in the reproduction of dictated matter, because by stopping and starting some words are invariably lost. By means of the stopping and starting device forming the subject of this application this drawback is overcome, inasmuch as the phonograph when the machine is stopped automatically moves a little backward, so that when it is started again the sounds which would otherwise be lost become audible, and under certain circumstances also the last words previously heard are repeated.

In accordance with the present invention I employ a controlling device which when the driving-motor is stopped either starts a second motor working in the opposite direction of the driving-motor and also engaging with the phonograph or reverses the driving-motor itself and when the controlling device runs out the second motor or the reversed driving-motor is put out of gear by the controlling device. As a controlling device any mechanism may serve which will automatically stop after a certain time and which is adapted to reverse the driving-motor or to drive the second motor.

The device is preferably so arranged that the controlling-lever of the driving-motor of the phonograph at the moment of stoppage releases a catch acting upon the controlling device, whereupon this latter starts the second motor or reverses the original driving-motor. Moreover, the stopping of the con-

trolling device is effected either by the automatic engagement of the catch or by the running down of the controlling device itself.

As already stated, any suitable mechanism may be employed as a controlling device, and as the simplest thereof may be mentioned a clockwork mechanism which puts the second motor in operation during the working period or reverses the driving-motor or drives itself directly by mechanical means. The clockwork must be arranged automatically to put itself out of gear after a given time and to stop the second motor or the reversed motor.

Reference is had to the accompanying drawings, in which a suitable device of this kind is illustrated, by way of example, in Figure 1 in front elevation, and in Figs. 2 and 3 in side elevation.

It is assumed in the embodiment illustrated in the drawings that the phonograph possesses two electric motors A and B, revolving in opposite directions. These two electric motors A and B are connected in such a manner with a part bearing the phonogram (not shown in the drawings) that the phonogram is turned by motor A in one direction and by motor B in the opposite direction. Obviously instead of electric driving mechanical driving may be employed, whereby the driving mechanism must be so arranged that it will operate backward or forward.

Upon the housing is supported a lever *c*, revoluble about the point *b*. If this lever be moved out of the position shown in the drawings, whereby the driving-motor A is cut out, the catch *d*, attached thereto, comes in contact with the projection *f'* of the lever *f* and causes this to revolve upon the pivot *h*, so that the arm *f*² is raised. In the depressed position the end of the arm *f*² rests against the projection *i* on a disk *k*. The latter is placed upon the shaft *m*, which is driven by means of a spring-drum *o* by means of a train of wheels *p*. Upon the shaft *m* is further placed a disk *q*, which is provided with an insulation-plate *r*, on which a contact-spring *s* presses in the position shown in the drawings. Between the disk *q* and a disk *t*, upon which another contact-spring *u* presses, is a conducting connection. (Not illustrated in the drawings.)

As long as the lever *a* occupies the position illustrated in Fig. 1 the spring *s* remains in contact with the insulated plate *r*. If the driving-motor A is cut out by means of the lever *c*, the arm *f*² is raised by the striking

of the catch *d* against the projection *f'* of the lever *f*, and the arm *f*² releases the disk *k*, which revolves under the influence of the train of gearing, and thereby turns the
 5 disk *q*, whereupon this disk comes into contact with the spring *s*, and the circuit for the second motor B, working in the opposite direction of the motor A, is closed. After the catch *d* has passed the projection *f'* the loaded
 10 end *f*² of the lever *f* rests again upon the periphery of the disk *k*, and as soon as this disk has made a full revolution the projection *i* comes into abutment with the end *f*², and the clockwork is stopped. At the same time
 15 the current for the motor B is interrupted by reason of the spring *s* coming into engagement with the insulated plate *r*, and the motor B is stopped. The phonogram of the phonograph has consequently been turned
 20 backward during the time of the revolution of the disk *k*. When the machine is again started, the sounds which would otherwise have been lost become clearly audible, and by suitable arrangement of the wheels of the
 25 clockwork also the last-spoken sounds are repeated.

Having thus described my invention, what I claim as new is—

1. In reversing mechanism for phono-

graphs, the combination with the driving- 30
 motor, and the lever controlling said motor, of means controlling the reversing movement of the phonograph, and means for locking
 said controlling means, said locking means 35
 being operated by the controlling-lever to release said controlling means.

2. In reversing mechanism for phonographs, the combination with the driving-
 motor, and the lever controlling said motor, 40
 of means controlling the reversing movement of the phonograph, and a catch normally engaging said means and adapted to be released
 by the controlling-lever.

3. In reversing mechanism for phonographs, the combination with the driving- 45
 motor, and the lever controlling said motor, of a second motor for effecting the reversing movement of the phonograph, and means
 controlling said second motor, and adapted 50
 to have its operation effected by the controlling-lever of the driving-motor.

The foregoing specification signed at Cologne, Germany, this 13th day of July, 1904.

ERNST SOLLORS.

In presence of—

WILLIAM KNEPPERS,
 JOH. SCHULZ.

No. 832,896.

PATENTED OCT. 9, 1906.

W. N. DENNISON.
AMPLIFYING HORN FOR TALKING MACHINES.

APPLICATION FILED MAY 8, 1903.

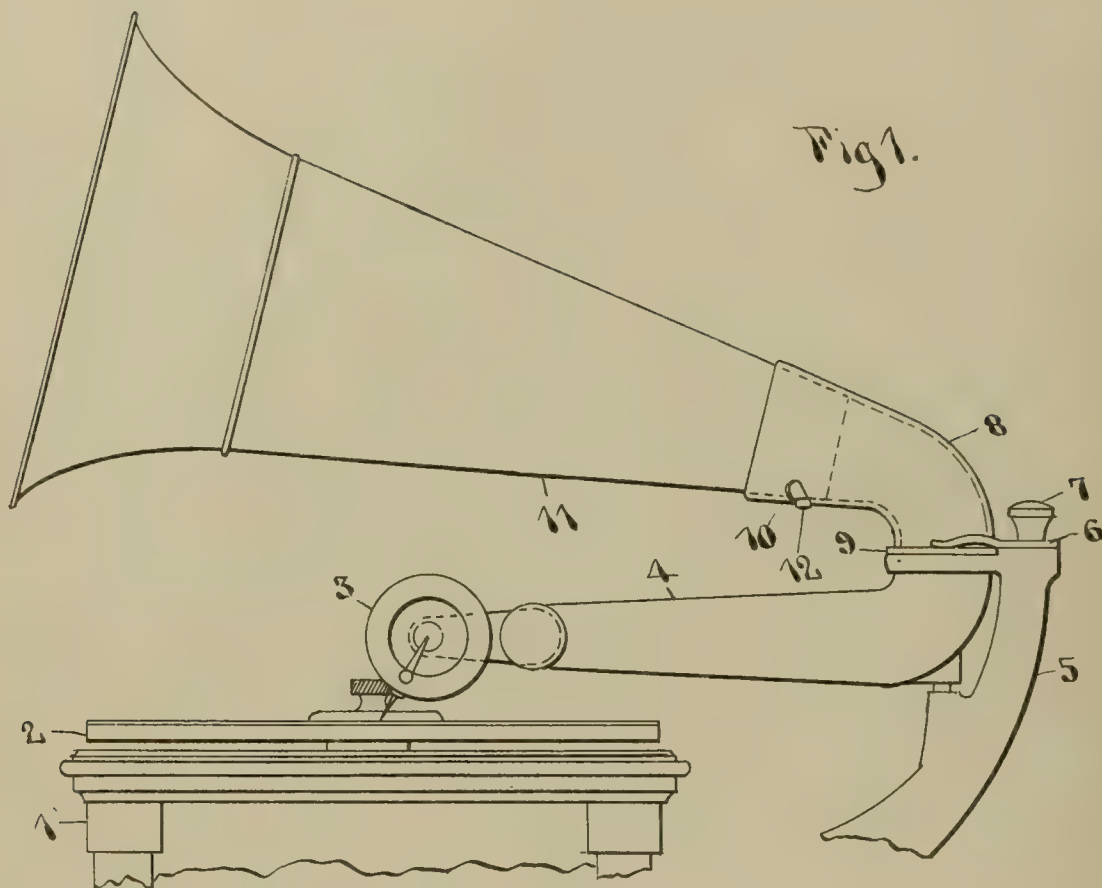
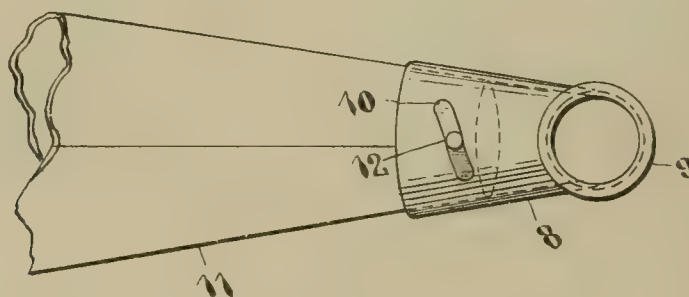


Fig 2



WITNESSES:

Edw. W. Vaill Jr
J. Henderson.

INVENTOR:

Wilburn N. Dennison

by H. M. Felt.

ATTORNEY:

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

AMPLIFYING-HORN FOR TALKING-MACHINES.

No. 832,896.

Specification of Letters Patent.

Patented Oct. 9, 1906.

Application filed May 8, 1903. Serial No. 156,141.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of Camden, State of New Jersey, have
5 invented certain new and useful Improvements in Amplifying-Horns for Talking-Machines, of which the following is a full, clear, and complete disclosure.

My invention relates to amplifying-horns
10 for talking-machines, and more especially to means for detachably mounting the horn upon the machine and for connecting sections of the horn in a readily-detachable manner, as will be hereinafter described and claimed.

15 In the accompanying drawings, which illustrate one embodiment of my invention, Figure 1 is a side elevation of the essential parts of a talking-machine having my improved amplifying-horn in use in connection therewith, and Fig. 2 a bottom plan view of the
20 amplifying-horn detached from the machine.

In the drawings, the reference-numeral 1 indicates the motor-casing; 2, the turn-table and record thereon; 3, the sound-box; 4, the
25 tapering hollow pivoted sound-box-supporting-tube; 5, the supporting-bracket for said arm and the amplifying-horn; 6, a yoke for holding the amplifying-horn in position, and 7 a thumb-screw for securing the yoke 6
30 to the bracket 5.

The above-described parts are not of my present invention, which relates to the amplifying-horn 11 and the tubular member or sound-conveyer section 8 thereof, being the
35 means by which the horn is supported upon the machine, which in the embodiment shown consists of a curved or elbow portion having means for engaging a support—for instance, a flange 9, by which it is held upon
40 bracket 5 by yoke 6. The section 8 flares outwardly, and its outer end receives the small conical or tapering end of the detachable and separable body-section 11 of the horn, this small end fitting therein. The section 8, it might be said, forms a part of the
45 horn as well as of the machine, for while it forms the small end portion or section of the horn as a whole, yet it is secured to a stationary part of the machine and is, in fact, the
50 means for supporting the body of the horn upon the machine. In fact, however, the horn consists of these two telescopic separable tapering sections 8 and 11, the larger end of the former receiving within it the

small end of the latter, and as a further part 55 of my invention I provide connecting means for these sections comprising interengaging or interlocking parts carried thereby. These means are upon the large end of section 8 and the small end of section 11, and as a preferred, 60 convenient, and efficient construction I employ an inclined slot 10, preferably in section 8, and the lug or pin 12 in section 11.

In assembling the sections of the horn the small end of the section 11 is inserted within 65 the large end of the section 8, the relative diameters of the parts being such that the stud will enter the outer end of the slot 10. If the parts are then turned relatively axially, the pin or lug 12 is forced along the slot until 70 prevented moving farther by the exterior of the section 11 engaging firmly with the interior of the section 8, it being noted that by reason of the pin-and-slot construction the two sections are drawn together longitudinally. 75 The parts are then held firmly in position and can only be disengaged by reversing the operation above described.

The interior diameter of the section 8, at the end of the slot adjacent its large end, can 80 of course be sufficient to permit the pin to enter this end of the slot when the parts are brought together; but if the material of which the section 11 is made is compressible, as it sometimes is, owing to the thin sheet 85 material composing it, the small end of the section 11 can be slightly compressed, so as to snap the pin into the upper end of the slot. The section 11 may also be slightly compressed when the pin is being removed from 90 the slot.

Owing to the tapering features of the two sections of the horn, a joint is required which will not only allow the parts to be easily assembled and separated, but which will at the 95 same time be strong and durable, and such joint is provided by my invention in a simple and efficient manner, and although I have shown and described specifically a pin on the small end of the section 11 and an inclined 100 slot at the large end of the section 8, yet, except in the claims for this specific construction, my invention is not limited thereto, but

What I claim as new, and desire to secure by Letters Patent of the United States, is— 105

1. A sound-conveyer support, a tapering sound-conveyer section mounted thereon, and an amplifying-horn section detachably

mounted upon said conveyer-section, and removable therefrom while the latter is mounted upon its support.

2. An amplifying-horn consisting of a tapering sound-conveyer section having means for engaging a support, and an amplifying-horn section detachably mounted upon said tapering conveyer-section, and removable therefrom while the latter is mounted upon its support.

3. An amplifying-horn consisting of a sound-conveyer section having means for engaging a normally stationary support, an amplifying-horn section detachably mounted upon said conveyer-section, the ends of said conveyer and horn sections telescoping, and interlocking means carried by said sections and adapted to hold them in telescoped relation, the said horn-section being removable from said conveyer-section while the latter is mounted upon its support.

4. An amplifying-horn consisting of a sound-conveyer section having means for engaging a normally stationary support, an amplifying-horn section detachably mounted upon said conveyer-section, the ends of said conveyer and horn sections telescoping, and interlocking means carried by said section and adapted to draw them together longitudinally and hold them in telescoped relation.

5. An amplifying-horn consisting of separable, tapering telescopic sections, one of said sections having means for engaging a support, the small end of one section fitting within the large end of the other section, a pin or lug carried by one of said sections and adapted to engage a slot in the other of said sections for holding the said parts in telescoped relation.

6. In an amplifying-horn, separable, tapering, telescopic sections, the large end of one section being provided with a slot, and the small end of the other section fitting within the said large end and being provided with a pin or lug to engage said slot to hold the part in telescoped relation.

7. In an amplifying-horn, separable, tapering, telescopic sections, the small end of one section fitting within the large end of the other section, a pin or lug carried by one of said sections and adapted to engage an inclined slot in the other of said sections for holding the said parts in telescoped relation.

8. An amplifying-horn comprising a large straight section and a small elbow-section, said elbow-section having means for engaging a support, the small end of the large section fitting within the large end of the elbow-section and interlocking means carried by said sections and adapted to hold them in telescoped relation.

9. The combination with a talking-machine, of a tubular section mounted thereon and having an outwardly-flaring free end, and a separable amplifying-horn section, having

its small tapering end detachably fitting within the flaring end of said tubular section, said tubular section forming the means for supporting said horn-section upon the machine.

10. The combination with a talking-machine, of a tubular elbow-section mounted thereon and having an outwardly-flaring free end, and a separable amplifying-horn section, having its small tapering end detachably fitting within the flaring end of the elbow-section, said tubular section forming the means for supporting said horn-section upon the machine.

11. The combination with a talking-machine, of a tubular section mounted thereon and having an outwardly-flaring free end, a separable amplifying-horn section having its small tapering end detachably fitting within the flaring end of said tubular section, and interengaging means between said sections for holding said parts together, said tubular section forming the means for supporting the said horn-section upon the machine.

12. In a tapering tube or horn, telescoping sections which are relatively transversely elastic, said sections being provided with interlocking means which are held in engagement by said elasticity, said interlocking means also being adapted to draw said sections together longitudinally.

13. In a tapering tube or horn, separable sections having elastic relation, the small end of one section fitting within the large end of the other section, a projection carried by one of said sections and an opening in the other of said sections, said opening and projection being adapted to be retained in engagement by the elasticity of one or both of said sections.

14. In a tapering tube or horn, separable sections adapted to telescope with each other, the small end of one section fitting within the large end of the other section, one of said sections being provided with a slot and the other with a projection, said projection and said slot being adapted to be held in engagement by the spring of said parts.

15. In a tapering tube or horn, separable sections adapted to telescope with each other and being transversely elastic relatively, the small end of one section fitting within the large end of the other section, one of said sections having a projection and the other a slot, said projection and slot being adapted to be held in engagement by the spring of said parts.

16. In a tapering tube or horn, sections adapted to telescope with each other, a pin carried by one of said sections and an inclined slot in the other of said sections, said pin and said slot being adapted to engage each other to hold said sections in wedged relation.

17. In a tapering tube or horn, sections adapted to telescope with each other and being relatively elastic transversely, a pin car-

ried by one of said sections and an inclined slot in the other of said sections, said pin being retained within said slot by said elasticity, and said sections being retained in wedged relation by said pin and slot.

18. A sound-conveyer support, a sound-conveyer section mounted thereon, an amplifying-horn section detachably mounted upon said conveyer-section and telescoping therewith, and means carried by said sections adapted to draw them together longitudinally and hold them in telescoped relation.

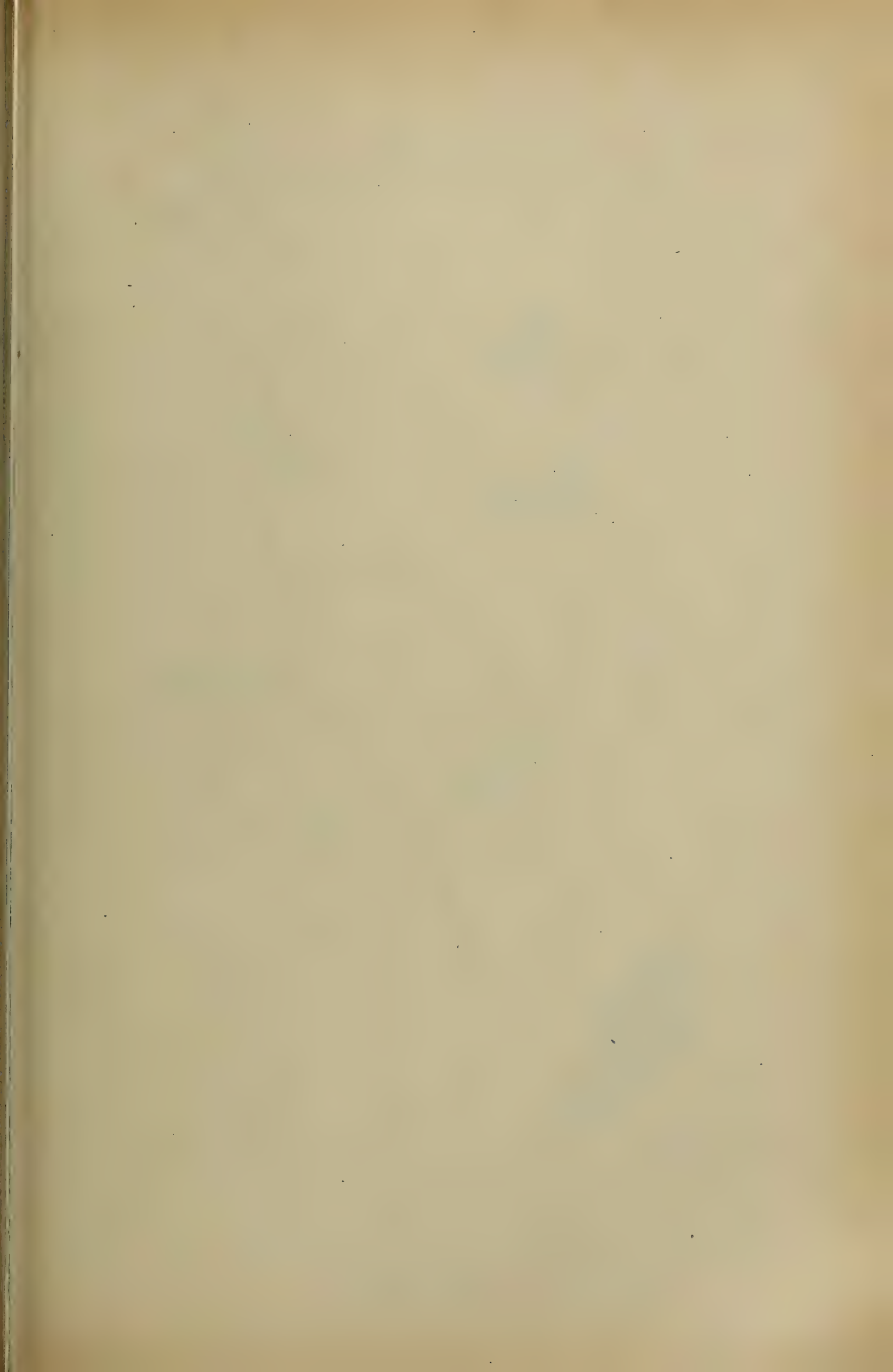
19. A sound-conveyer support, a sound-conveyer section mounted thereon, and an amplifying-horn section detachably mounted within said conveyer-section and removable therefrom while the latter is mounted upon its support.

In witness whereof I have hereunto set my hand this 7th day of May, 1903.

WILBURN N. DENNISON.

Witnesses:

LEWIS H. VAN DUSEN,
EDW. W. VAILL JR.



I. KITSEE.

APPARATUS FOR DUPLICATING PHONOGRAPH RECORDS.

APPLICATION FILED APR. 20, 1901.

2 SHEETS—SHEET 1.

Fig. 1.

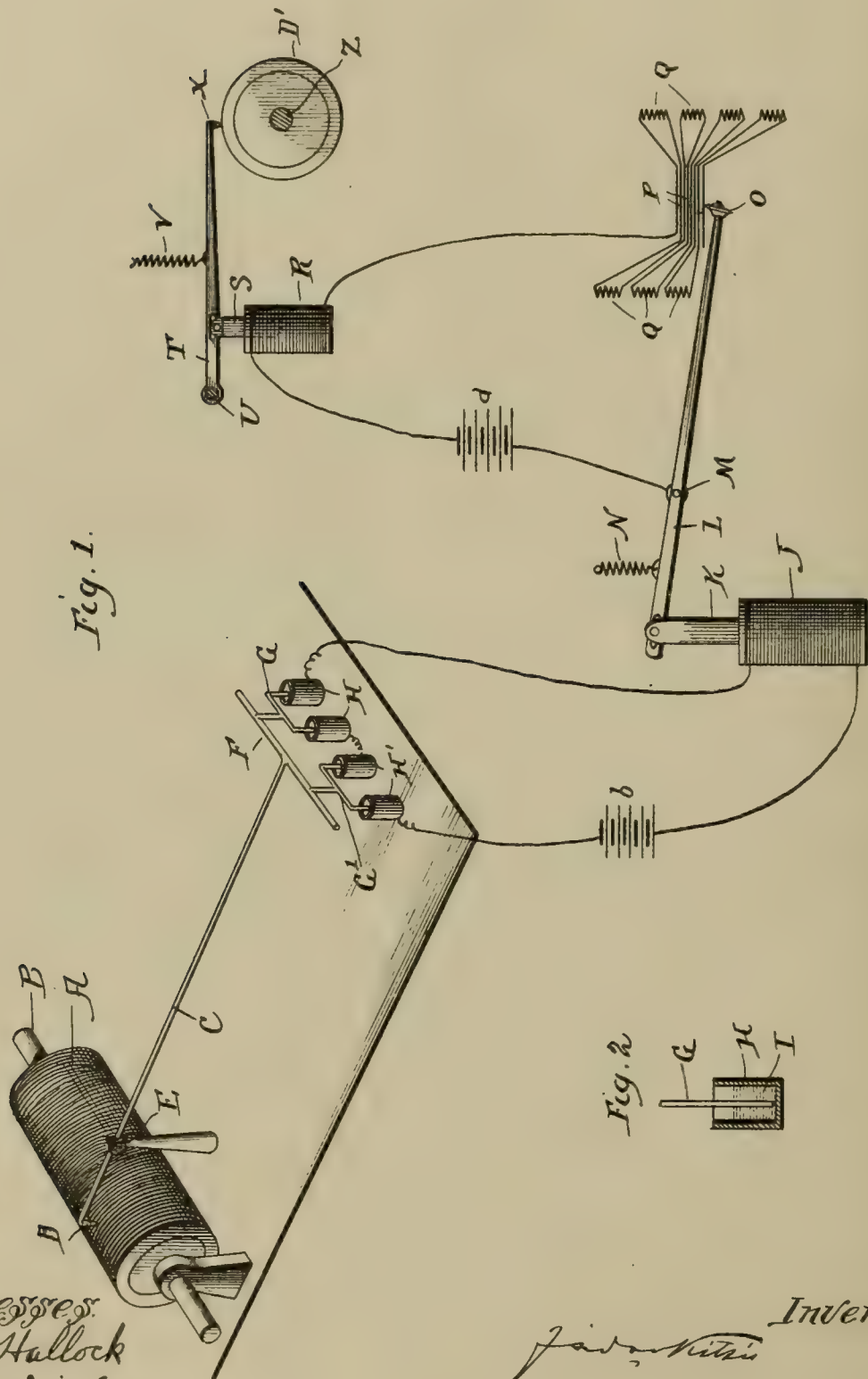
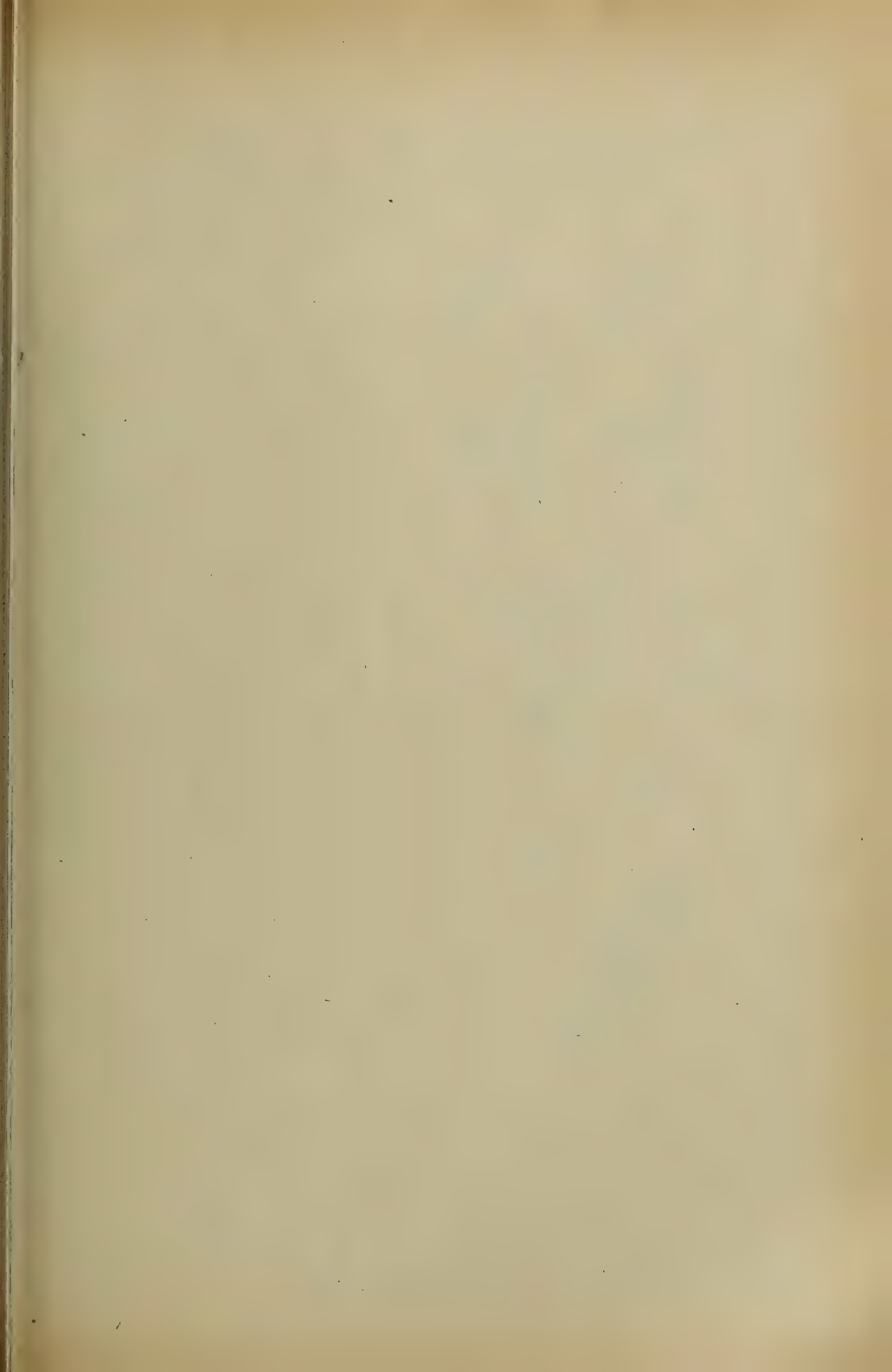


Fig. 2.



Witnesses:
H. B. Hallock
E. C. Stille

Inventor:
I. Kitsee



I. KITSEE.

APPARATUS FOR DUPLICATING PHONOGRAPH RECORDS.

APPLICATION FILED APR. 20, 1901.

2 SHEETS—SHEET 2.

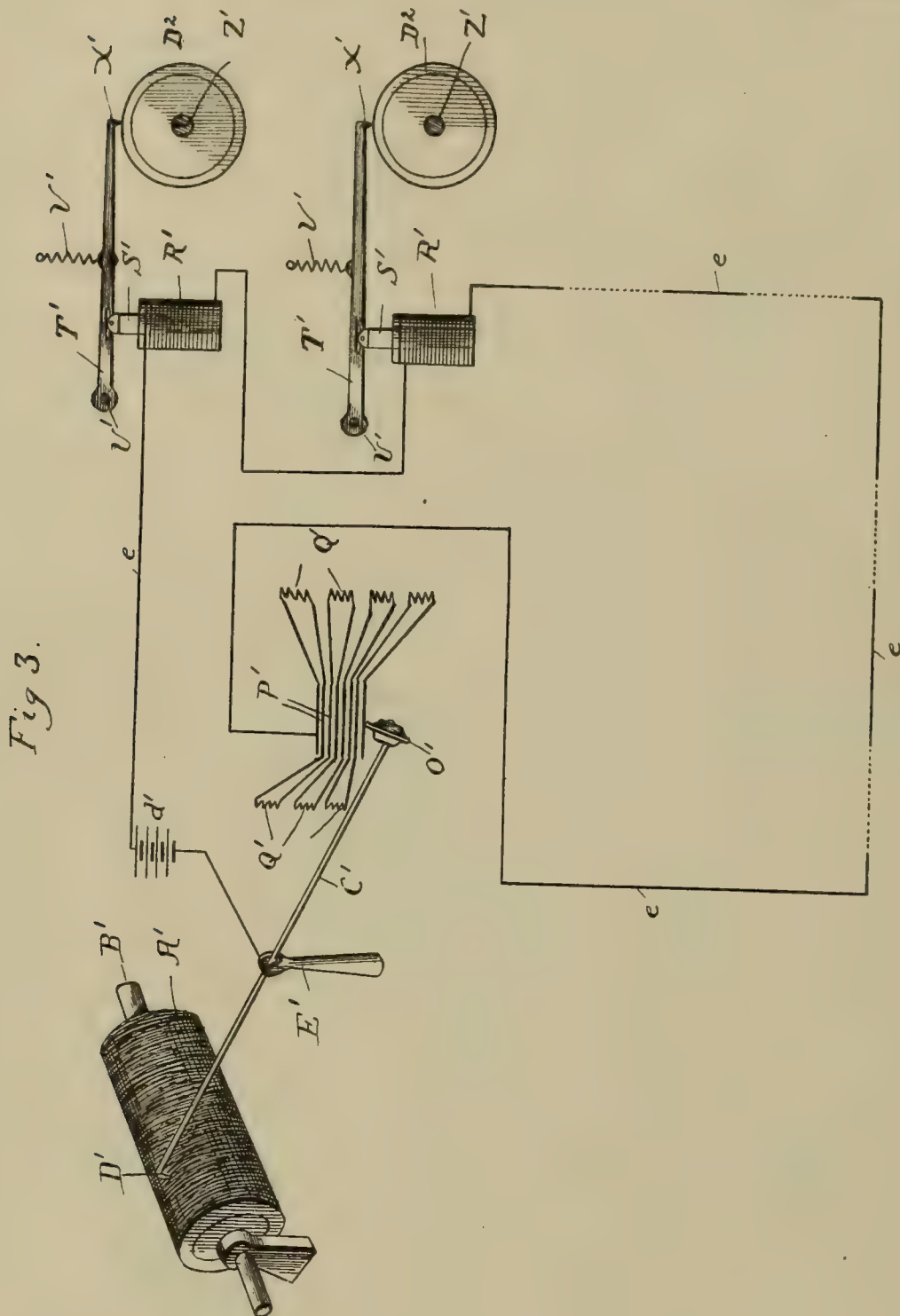


Fig 3.

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Chas. Kussner

INVENTOR

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR DUPLICATING PHONOGRAPH-RECORDS.

No. 833,689.

Specification of Letters Patent.

Patented Oct. 16, 1906.

Application filed April 20, 1901. Serial No. 56,755.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Duplicating Sound-Records, of which the following is a specification.

My invention relates to an improvement in apparatus for duplicating phonograph-records.

In the duplication of phonograph-records it is of great advantage to have the depressions of the original record corresponding to the sound-waves enlarged on the master-record, from which copies are to be made. It is also of great importance that it should be possible to make any desired number of copies at one and the same time from one master-record.

The two processes, mechanical as well as the process of electroplating, used to-day are inconvenient and not economical.

It is the aim of my invention to overcome the objections to the processes as carried out to-day, as well as to make use of the advantages above enumerated.

Referring now to the drawings, Figure 1 is a diagrammatic view of the circuits and mechanism for producing from the original the master-record. Fig. 2 is a vertical sectional view of one of the resistance-cups containing acid or other liquid. Fig. 3 is a diagrammatic view of the circuits and mechanism for producing a series of record copies from the master-record.

In Fig. 1, A is a phonograph-record from which the master-records are adapted to be made. B is the shaft upon which the same revolves, which shaft is fed transversely by means of screws or other mechanism. C is a lever which has the point D adapted to travel in the grooves of the record. This lever C is pivoted at E. F is a cross-bar on the outer end of the lever C, which has the downwardly depending forks G and G'. Each prong of the fork G enters a resistance-cup H, and each prong of the fork G' enters a resistance-cup H'. Each of these cups contains a preferable liquid resistance I. The outside cup H' is connected, with the interposition of the battery b, to one end of a coil surrounding a solenoid J, and the outside cup H is connected to the other end of the coil surrounding the solenoid J. The two inside cups are connected together in series.

K is the armature adapted to be attracted by the solenoid J. The upper end of this armature is pivotally connected to the lever L, which lever is pivoted at M and adapted to be held in its normal position by the spring N. O is a contact secured to the end of the lever L. P represents conductors, preferably bars or wires set close together, all the wires being connected in series to the resistance Q. One terminal of these bars or wires is connected to one end of the coil surrounding the solenoid R, and the other end of the coil is connected, with the interposition of the battery d, to the lever L. S is an armature adapted to be operated upon by the solenoid R, being pivotally connected at its upper end to the lever T, which is pivoted at U. V is a spring for holding this lever in its normal or upper position. X is an engraving-point. D' is a cylinder of suitable material adapted to be engraved and to be used in the later process as the master-record. Z is the shaft upon which this cylinder rotates.

In Fig. 3, A' is the master-record, from which the record copies are adapted to be made. B' is the shaft of the master-record. C' is the lever with its reproducing-point D'. This lever is pivoted at E' and provided with the wheel or other suitable contact O'. P' represents conducting wires, bars, or plates in proximity to the contact O'. These wires are connected together through resistance Q'. The lever E' is connected to one pole of the battery d', the other pole of which is connected to the circuit e, in which circuit are placed the reproducing devices, consisting each of the solenoid R', armature S', and lever T', the lever being pivoted at U' and held in its upward position by the spring V'. This lever is provided with the engraving-point X'. In proximity to this point is the cylinder D', adapted to have depressed or engraved thereon a reproduction of the depression of the master-record D'. This cylinder is provided with the shaft z'.

In the circuit e the dotted lines represent spaces wherein one or more of the reproducing devices may be placed. The terminal of the circuit is connected, preferably, to the upper conducting-wire P'.

I will now describe the operation of producing the master-record from the original record. The original record is produced in the usual manner. The first aim in producing a master-record from an original record is to

enlarge the undulations of the original record, due to the engraving-tool actuated according to the sound-waves, or to have the cutting-tool of the master-record to act on the same with sufficient force so as to make depressions on a material tough or hard enough to withstand the wear and tear to which the master-record has to be subjected.

If the cylinder of the master-record consists of a material easily to be defaced—such, for instance, as the soap-wax composition usually employed in producing phonograph-records—then it is best to enlarge the undulations, for the reason that such a cylinder should be provided with a surface not so easily defaced as the waxy cylinder. This can be done by either electroplating the surface or providing the same with a film of celluloid in a manner as is set forth in my Letters Patent No. 583,686, of June 1, 1897, the film not to be removed from the cylinder, or the film may consist of any other suitable material.

The undulations of the cut-away parts of the original cylinder differ in depth; but it is taken for granted that the least variation is equal to about 0.001 of an inch. To increase this difference or to produce through this variation a stronger force, with the aid of electric currents, two means can be employed: First, the lever with the stylus can be pivoted in a manner so that that part which is adapted to vary the strength of the electric current employed should be greater than that part which bears the reproducing-stylus. Second, a resistance may be employed which, offering the least resistance to the variation of the upward and downward movement of the lever, is adapted to give a comparative great variation of the current through a comparative slight movement of the conductor. This resistance may be multiplied. In the drawings this resistance is illustrated as consisting of non-conducting cups H H', provided with the conducting-bottoms filled with the liquid. This liquid may consist of very diluted sulfuric acid or any othersuitable liquid, as any of the salt solutions—such, for instance, as a solution of chlorid of sodium or even a sulfate of copper, the only drawback to the last-named solution being that through the deposition of the copper the space between the lower end of the fork and the bottom of the cup may be decreased. Let it be supposed, as stated above, the least variation in the grooves is about 0.001 of an inch and that the ratio in length of the stylus part and the conducting part of the lever or rod is one to ten. Let it also be supposed that there are ten pairs of resistance-cups employed, each cup filled with water acidulated with five per cent. sulfuric acid, and the conducting-rods are of a diameter not larger than one-eighth of an inch.

To give an illustration of the variation of the current, and therefore the variation of the pull of the solenoid J on the core K, I cite the following:

The resistance of an acidulated solution of about one-fourth-inch diameter is about seventy-five ohms per inch. If now the ends of the forks are normally about one-sixteenth of an inch from the conducting-bottom and ten pairs of cups are inserted in the circuit, then the combined resistance of these cups will be in round numbers about ninety ohms, and taking the coil of the solenoid as twenty ohms we have a total resistance of one hundred and ten ohms. If the least variation in the movement of the stylus D is 0.001 of an inch and the resistance variation of the forks therefore one one-hundredth of an inch, it follows that the combined variation of the twenty forks (two in each of the ten pairs) is one-fifth of one inch, which will give a variation of fifteen ohms, or about one-seventh of the whole resistance of the circuit. Assuming now that the pull of the core in the solenoid is (the whole current flowing) one inch, then it follows that the pull into the solenoid if only six-sevenths of the current value is flowing is about one-seventh of an inch less, (not taking into consideration that the ratio of pull somewhat differs with the length of core inserted.) It is now supposed that the conducting-strips P consist of very thin platinum-foil separated from each other by a non-conducting film—such, for instance, as shellac—and that twenty-one layers of these foils, with their insulation, will equal one inch in thickness, and it is further supposed that the connection between one foil and the next succeeding foil includes a resistance of about five ohms. It follows that every movement of the core K, causing, as it does, a corresponding movement in the lever L, will increase or decrease the resistance of the circuit with about fifteen ohms for every one-seventh of an inch distance, and if the circuit consists of ten foils connected together through five-ohms resistance each and the coil of the solenoid R is of about twenty-ohms resistance it follows that the least variation in the stylus D will induce a variation of nearly one-fifth of the total resistance of the circuit actuating the core S. The pull on this core S can be made to suit through the increase or decrease of the battery *d* in the circuit. I have given this illustration only to show what degree of flexibility can be obtained from the device as illustrated. It is self-evident that the ratio of any one of the devices to each other can be changed at the will of the operator. The variation of the depressions on the cylinder D', therefore, due to the variation of the pressure of stylus X on said cylinder, can also be varied at will and can be made to suit requirements.

I will now describe the manner in which the record copies can be prepared from the master-record. The stylus E' is made part of a circuit in which are placed the electromagnetic devices, with the aid of which the depressions of the master-record are duplicated. In this circuit any desired number of such devices can be placed either in multiple arc or in series; but I prefer that they shall be placed in series, it being understood that the more devices there are in series the greater the electromotive force of the battery employed should be, and if too great a number are to be made at one and the same time for one circuit then it is necessary that two or more circuits are employed. The farther end of the lever C' is provided with the contact-wheel O', and this contact-wheel is adapted to make connection between one or the other of the contact-strips P'. The whole arrangement so far is a duplicate of the arrangement as shown in Fig. 1.

Through the variation of the resistance in the circuit due to the up-and-down movement of the contact-wheel O' the position of the levers S S' is also varied, and the depressions made by the stylus X' X' on the cylinders D² D² are then duplicates of the depressions made on the cylinder A'.

If it is desired that the copy-records should be permanent ones, then it is best, as stated above, to either electroplate the surface of these cylinders or to paint them with a film durable and compact enough so as to withstand ordinary wear and tear.

It is unnecessary for me to go into detail as to the process of electroplating, as such process is so well known to persons versed in the art as to require no further explanation.

In some cases—for instance, where the outer cylinder consists of gutta-percha or a like material—it is best to place this cylinder in hot water and produce the impression as long as the gutta-percha or a like material is made pliable with the aid of heat and moisture.

It is of great importance that in the production of the master-record the original record should be revolved at a very slow speed, because the effects of the fluctuation of the current will not produce the desired effect in

the solenoids if the variations follow each other in quick succession.

It is obvious that the speed of the cylinder adapted to become the master-record should be in unison with the speed of the original cylinder. The same precautions should also be taken in producing the record copies from the master-record.

The variations of the depressions on the master-record made according to this my invention are of such magnitude that any suitable device, mechanical or otherwise, may be substituted for the device as illustrated in Fig. 3, it being understood, however, that without the master-record only very delicate instruments can be used in connection with the stylus of the original record.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A phonographic reproducing device, comprising a master-record, a stylus associated therewith, an electric circuit, a source of current for said circuit, a variable resistance included in said circuit and of which said stylus forms a part, an electromagnet in said circuit, a cutting-stylus, and a blank in operative relation to said cutting-stylus, said electromagnet controlling the action of said cutting-stylus.

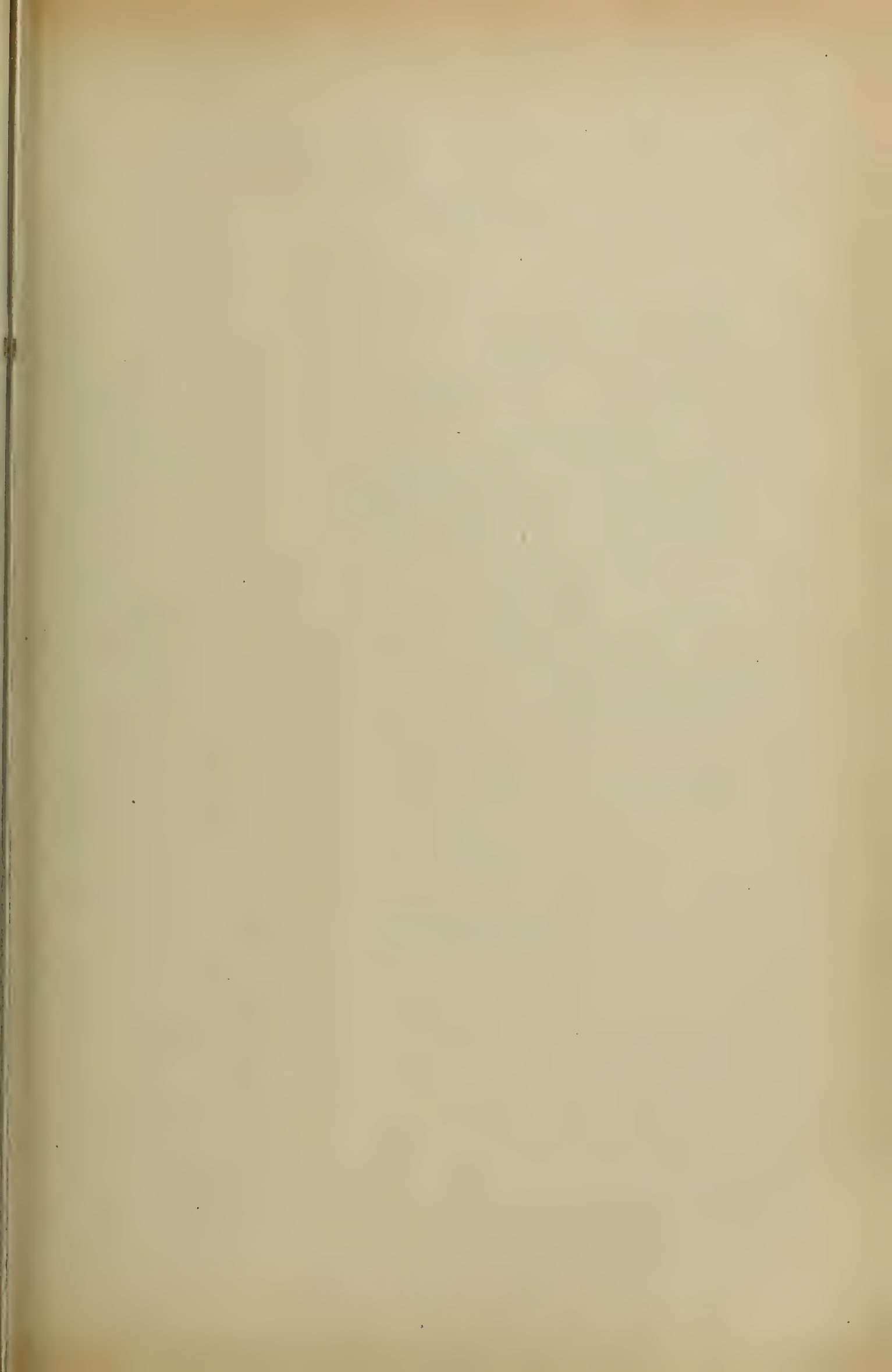
2. A phonographic reproducing device, embracing a master-record, a stylus, an electric circuit, a generator for said circuit, a series of electromagnets in said circuit, each of said electromagnets being in operative relation to a cutting-stylus, a series of blanks in operative relation to said cutting-styluses, and means whereby through the movement of the first-mentioned stylus the flow of the current through the different electromagnets is varied in accordance with the position of said stylus, the master-record and the blanks being rotated at substantially the same speed.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 17th day of April, A. D. 1901.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
CHAS. KRESSENBEECH.



No. 834,079.

PATENTED OCT. 23, 1906.

E. H. RIORDAN.
SPEED INDICATOR,
APPLICATION FILED FEB. 12, 1906.

Fig. 1.

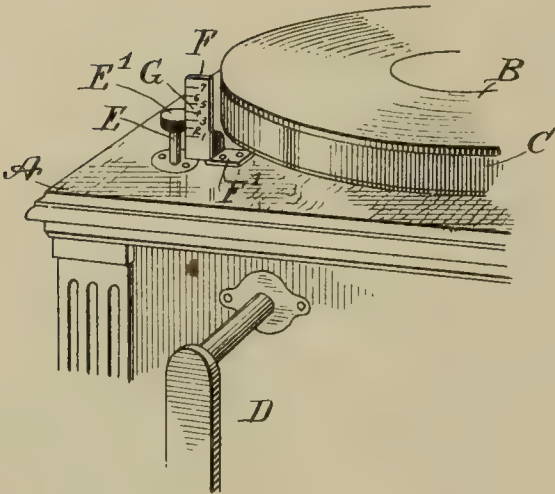
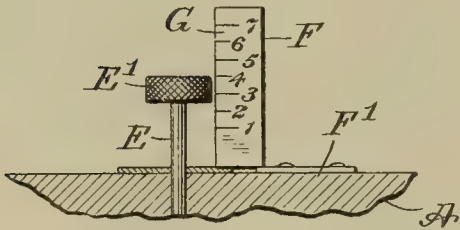


Fig. 2.



WITNESSES:

Dr. C. Abbott
Rev. G. Hostet

INVENTOR

Edmond Hugh Riordan

BY *Mum & Co*

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDMOND HUGH RIORDAN, OF IDAHO CITY, IDAHO.

SPEED-INDICATOR.

No. 834,079.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed February 12, 1906. Serial No. 300,681.

To all whom it may concern:

Be it known that I, EDMOND HUGH RIORDAN, a citizen of the United States, and a resident of Idaho City, in the county of Boise and State of Idaho, have invented a new and Improved Speed-Indicator, of which the following is a full, clear, and exact description.

The invention relates to talking-machines; and its object is to provide a new and improved speed-indicator arranged to enable the user of the machine to quickly and conveniently adjust the speed of the motor, and consequently that of the record, to insure playing of the record-piece in proper time.

The invention consists of novel features and parts and combinations of the same, which will be more fully described herein-after and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the views.

Figure 1 is a perspective view of the improvement as applied to a Victor talking-machine, and Fig. 2 is a sectional side elevation of the same.

The talking-machine of any approved construction is mounted on the usual casing A, and the record B is held on a turn-table C, driven by a suitable spring-motor arranged within the casing A and adapted to be wound up by winding-up mechanism D, extending to the outside of the casing A. The speed of the motor is regulated by the usual speed-regulating screw E, extending through the top of the casing A and having on its upper end a head E', adapted to be taken hold of by the operator for conveniently screwing the speed-regulating screw up or down to regulate the speed of the motor in the usual manner. Adjacent to this outer end of the speed-regulating screw E is arranged a vertically-disposed indicator-plate F, provided at its lower end with a flange F', fastened by nails, screws, or like fastening devices to the top of the casing A between the regulating-screw E and the turn-table C, as plainly indicated in Fig. 1. On the front face of the indicator-plate F is arranged a graduation G, preferably consisting of spaced lines numbered consecutively, as shown in the drawings, the top face of the head E' of the regulating-screw E indicating on the said lines to indicate the speed of the motor.

In using the Victor talking-machine the

operator places a record B on the turn-table C, then starts the motor. The operator now screws the speed-regulating screw E up or down until the proper speed is obtained—that is, the piece of music or the like is reproduced in correct time. When this has been done, the motor is stopped and the user of the machine marks the record B in any suitable manner with the graduation-numeral corresponding to the mark opposite the top of the head E'. Thus when the marked record is later on again used on the machine it is only necessary for the operator to look at the numeral marked on the record, and then the operator adjusts the speed-regulating screw E until the top of the head E' registers with the corresponding numeral on the indicator-plate G. When the motor then is started, the record is turned at the proper speed to reproduce the piece of music in correct time.

The indicator is very simple and durable in construction and can be readily applied to machines now in use, it being evident that the owner of the machine can readily mark the records as above described to allow future reproductions of the record-piece in proper time. It is also evident that the indicator may be applied to new machines and the records marked correspondingly by the manufacturers of the machines and before they are sold.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a speed-indicator for a talking-machine, the combination with the machine-casing and the speed-regulating screw of the motor for the talking-machine adjustable in and out of the casing to regulate the speed of the motor, of an indicator-plate having means for attachment to the machine-casing, the said indicator-plate extending parallel with the speed-regulating screw and provided with a graduation on which the speed-regulating screw indicates.

2. In combination with a talking-machine having a casing, a turn-table and a speed-regulating screw, of an indicator-plate disposed vertically on top of the casing adjacent to the head of the said speed-regulating screw, the said screw being adjustable lengthwise of and parallel with the said plate, and a graduation on the said plate with which the screw may be adjusted to aline the top of said screw with said graduation.

3. In combination with a talking-machine

having a casing, a turn-table and a speed-regulating screw, of an indicator-plate disposed vertically on top of the casing adjacent to the head of the said speed-regulating
5 screw, the said plate being provided at its bottom with a flange attached to the said casing, the said screw being adjustable lengthwise of and parallel with the said plate, and a graduation on the said plate with

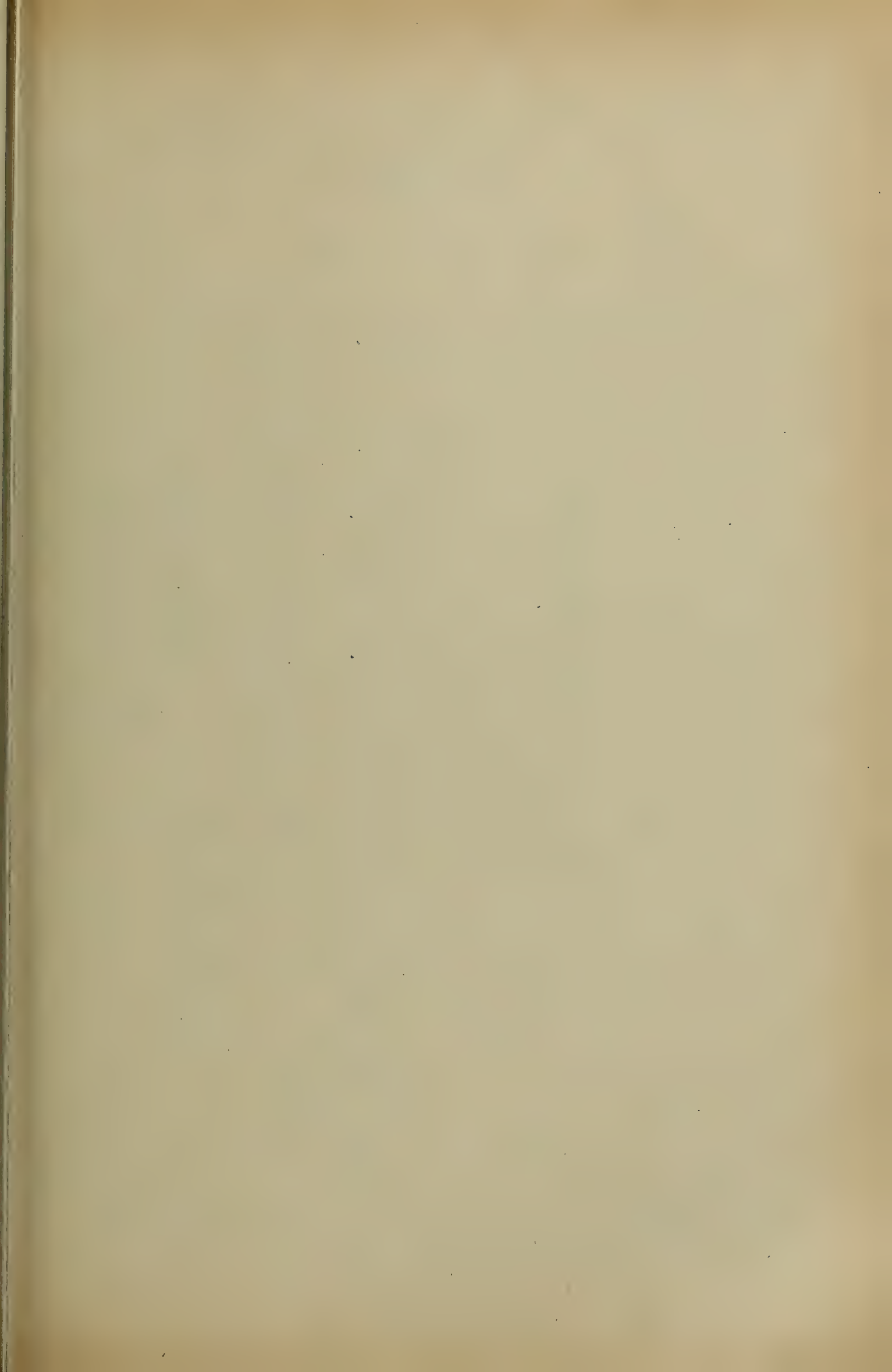
which the screw may be adjusted to aline the top of said screw with said graduation.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDMOND HUGH RIORDAN.

Witnesses:

WM. WARNER,
J. A. LIPPINCOTT.

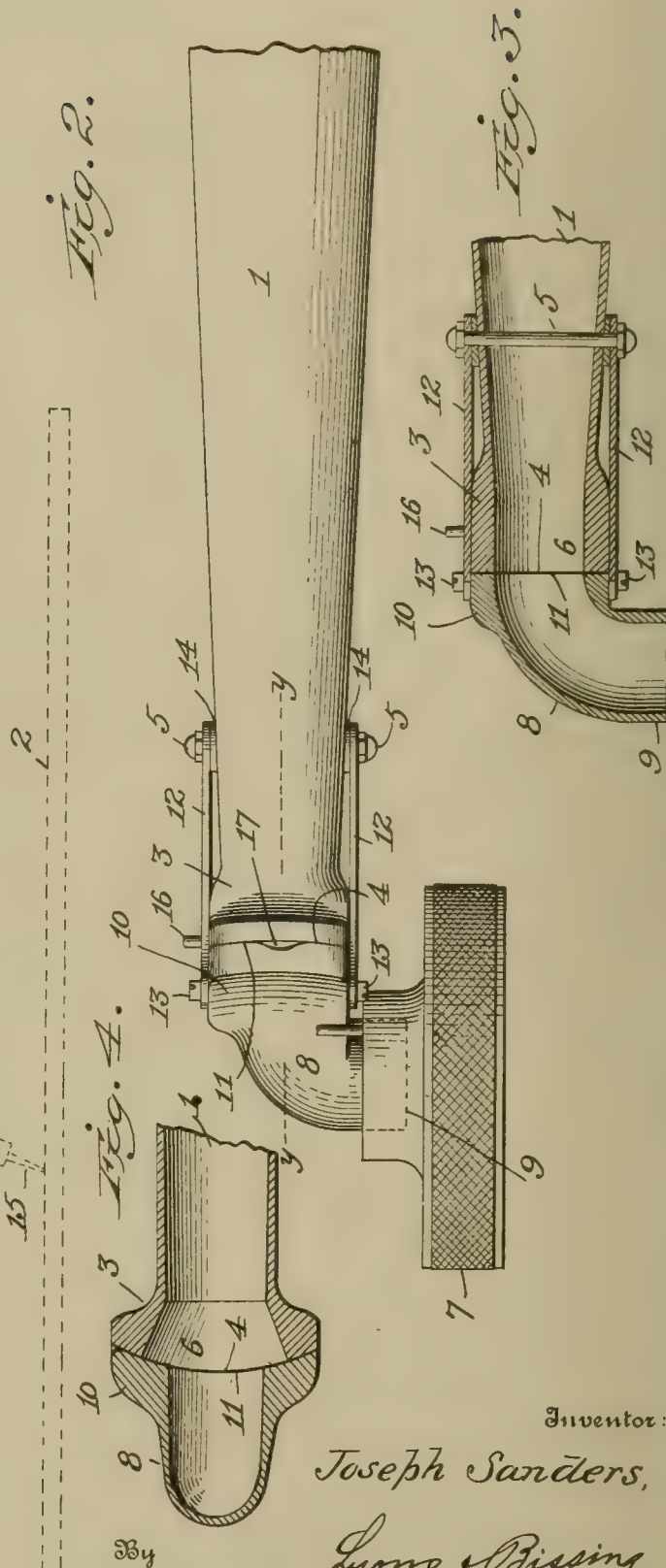
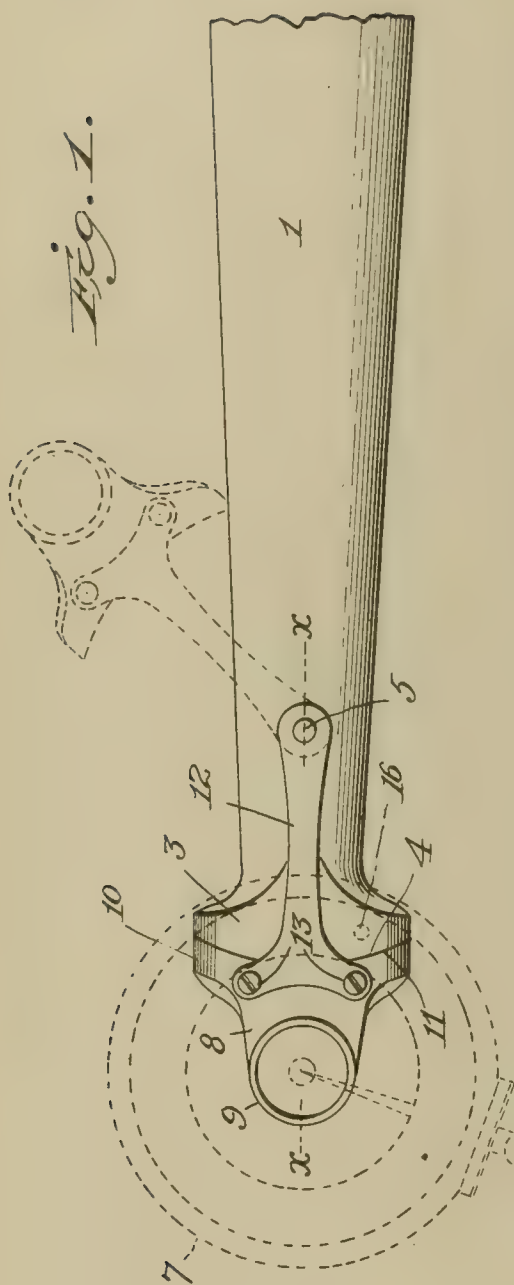


No. 834,326

PATENTED OCT. 30, 1906.

J. SANDERS.
GRAMOPHONE.

APPLICATION FILED AUG. 4, 1906.



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UNITED STATES PATENT OFFICE.

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GRAMOPHONE.

No. 834,326.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed August 4, 1905. Serial No. 272,737.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

This invention has reference to improvements in gramophones of the type wherein a tapering amplifying-horn or a section thereof is mounted to swing over a record-tablet only in a plane parallel thereto; and the object of my invention is to produce a means for mounting the sound-box whereby it may be carried by said tapering horn or horn-section and have freedom of movement in a plane at right angles to the plane of movement of the said horn.

The invention consists in providing a quadrantal neck for the sound-box, which neck is pivotally yoked to the taper section, so as to move in a curved path past the smaller or free end of said horn-section to bring the stylus of the sound-box in engagement with a sound-record groove or to bring the sound-box over onto the horn-section in position for the insertion or removal of a stylus. To insure a sound-proof joint between the quadrantal neck or sound-box carrier and the tapering horn-section, the meeting faces are curved on an arc the center of which is the pivot of the yoke joining the sound-box carrier to the horn-section. All this will appear from the following detail description, in which reference is made to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a side elevation of a portion of a taper horn-section and the quadrantal neck or sound-box carrier with the sound-box and a disk record-tablet shown in dotted lines. Fig. 2 is a plan view of the structure shown in Fig. 1 with the sound-box shown in full lines and the record-disk omitted. Fig. 3 is a section on the line *x x* of Fig. 1, and Fig. 4 is a section on the line *y y* of Fig. 2.

The hollow taper arm or horn-section 1 is understood to be so supported as to swing over the record-tablet 2 in a plane parallel thereto only, as is now common in the art. The free or small end of this arm is composed of a head 3, which is here shown as formed in one piece with the horn-section, but which may be soldered or brazed to it, and it is of larger outer diameter than the adjacent por-

tion of the taper arm. The end face 4 of this head is curved outwardly on an arc the axis of which is coincident with that of a bolt or pin 5, passing horizontally and diametrically through the taper arm a short distance back of its free end. The bore of the taper arm is continued through the head 3 and terminates at the curved face 4 in a mouth 6, which flares at top and bottom, as shown in Fig. 4, for a purpose that will presently appear. The taper arm 1 carries a sound-box 7 of any approved type through the intermediary of a quadrantal hollow neck 8.

The neck 8 has one end 9 of such size as to fit into and carry the sound-box, and the other end 10 is expanded to match in size the head 3. The end 10 of the neck 8 is held in juxtaposition to the head 3, so that its face 11, which is curved on the same arc as the face 4 of the said head 3, is in sliding contact, or nearly so, with the said face 4. This is done by means of two yoke-arms 12, 12, securely fastened at one end to the end 10 of the neck 8, as by the screws 13, and at the other end journaled to the taper arm 1 by the bolt or pin 5, being pivotally confined between the heads of said bolt and felt or other non-resonant washers 14 interposed between the yoke and the walls of the taper arm. This construction permits the hollow quadrantal neck (and sound-box carried thereby) to be swung around the bolt 5 as a pivot through a curved path in a vertical plane, so that the sound-box style 15 may be brought into position to engage a record-groove, (in which case the end 10 of the neck 8 covers the free end of the taper arm,) or the neck and sound-box may be swung upward, over, and downward upon the top of the taper arm, as shown in dotted lines, Fig. 1, in which latter position a worn style may be readily removed from the sound-box or a new style inserted.

The passage through the hollow neck 8 may be substantially round and of the same diameter as the lateral diameter of the mouth of the taper arm. It therefore communicates with a part only of the mouth 6 in a vertical direction. This permits the neck to be moved vertically over the mouth of the taper arm for a limited distance without in any way restricting the free passage of the sound from the sound-box to the taper arm, and thereby provides for the vertical movements of the sound-box due to mechanical

inaccuracies found in all record-tablets and sound-reproducing machines, and also provides for the use of record-tablets of various thickness.

5 In order to limit the downward movement of the neck and sound-box, a stop-pin 16 may be provided on the head 3 below and in the path of one of the yoke-arms 12.

10 In order to protect the taper arm from being marred by the contact of the edge of the end 10 of the neck 8, the said edge is slightly indented, as indicated at 17, Fig. 2.

Accuracy of fit between the two faces 4 and 11 is not essential, since they may even
15 be separated slightly without interfering appreciably with the transmission of the sound from the neck to the taper arm, and of course these two faces may be curved laterally as well as vertically.

20 Instead of using my invention in connection with a sound-amplifying horn of the taper-arm type a straight horn may be used, in which case it will be mounted to move across the record-tablet only in a plane parallel thereto.

25 Having described my invention, what I claim is—

1. In a sound-reproducing machine, the combination with a tapering sound-amplifier
30 constrained to move over a record-tablet in a plane parallel thereto and terminating at its smaller end in a mouth in line with the bore of said amplifier, of a sound-box support carried by said amplifier and movable across
35 the said mouth thereof into and out of communication therewith, substantially as described.

2. In a sound-reproducing machine, the combination with a tapering sound-amplifier
40 constrained to move over a record-tablet in a plane parallel thereto and terminating at its smaller end in a mouth in line with the bore of said amplifier, of a quadrantal neck, for supporting a sound-box, carried by said
45 amplifier and movable across the said mouth

into and out of communication therewith, substantially as described.

3. In a sound-reproducing machine the combination with a sound-amplifier having a flaring mouth at its smaller end, and a sound-
50 box carrier movable across said flaring mouth in one plane only and having a sound-conveying passage through it of less area than that of the flaring mouth, substantially as described.

4. In a sound-reproducing machine, the combination with a sound-amplifier, of a sound-box carrier pivoted to the sound-amplifier and movable across the same in a curved path, the meeting faces of the carrier
55 and amplifier being curved on an arc described about the axis of the carrier, substantially as described.

5. In a sound-reproducing machine, the combination with a sound-amplifier formed
65 with a curved end face, a sound-box carrier having a correspondingly-curved face, and yoke-arms fast to the sound-box carrier and pivotally connected to the amplifier, whereby the sound-box carrier is constrained to
70 move in a curved path over the end face of the amplifier, substantially as described.

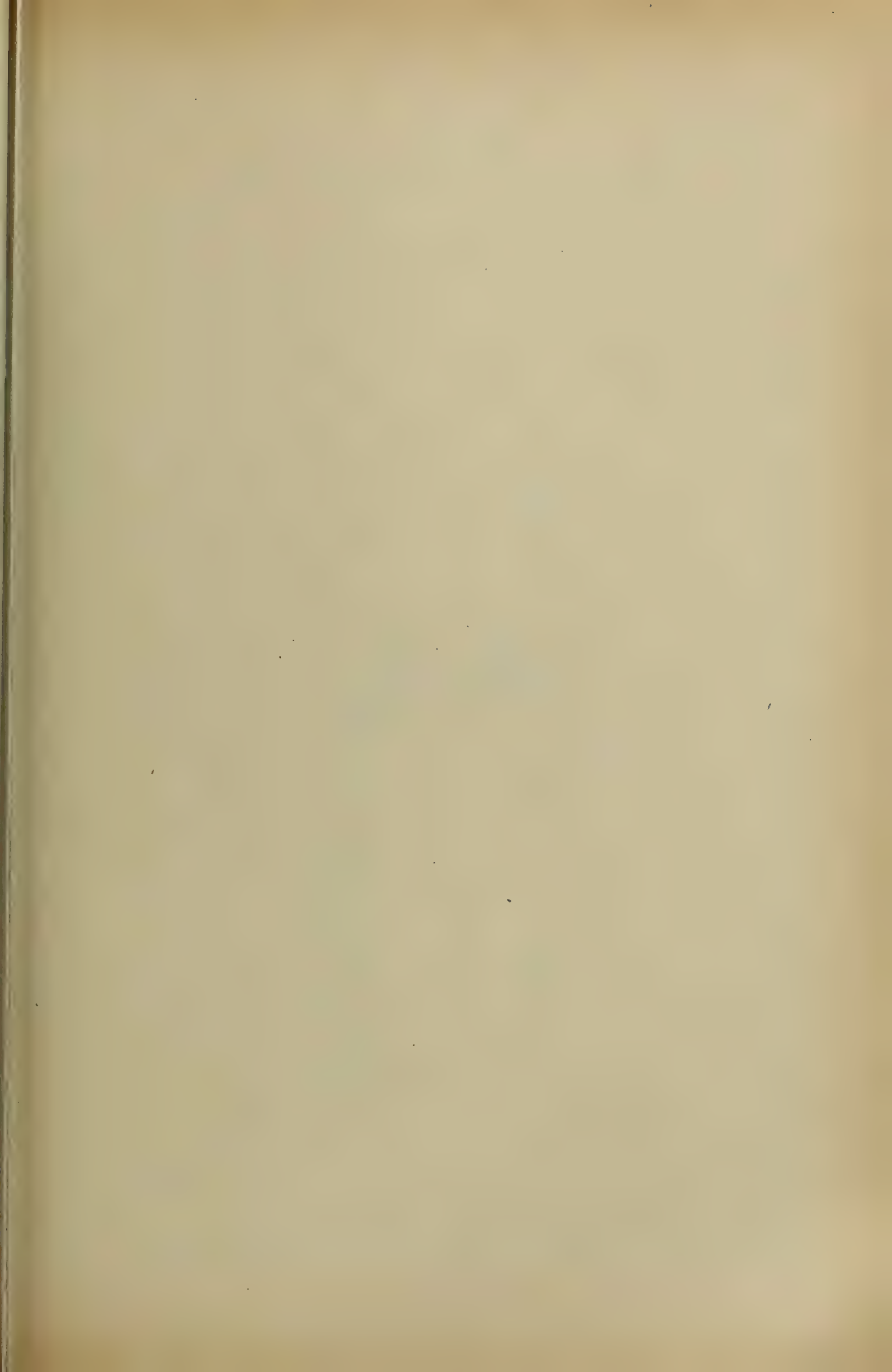
6. In a sound-reproducing machine the combination with a tapering sound-amplifier movable in one plane only over a sound-rec-
75 ord, and having its smaller end formed with a curved face and flaring mouth, of a sound-box carrier composed of a hollow, quadrantal neck having a curved face movable over the curved face of the amplifier contiguous there-
80 to, and yoke-arms fast on the neck and pivotally connected to the amplifier, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of
85 two subscribing witnesses.

JOSEPH SANDERS.

Witnesses:

ABRAHAM KAUFMAN,
HELEN FRANZ.



No. 834,485.

PATENTED OCT. 30, 1906.

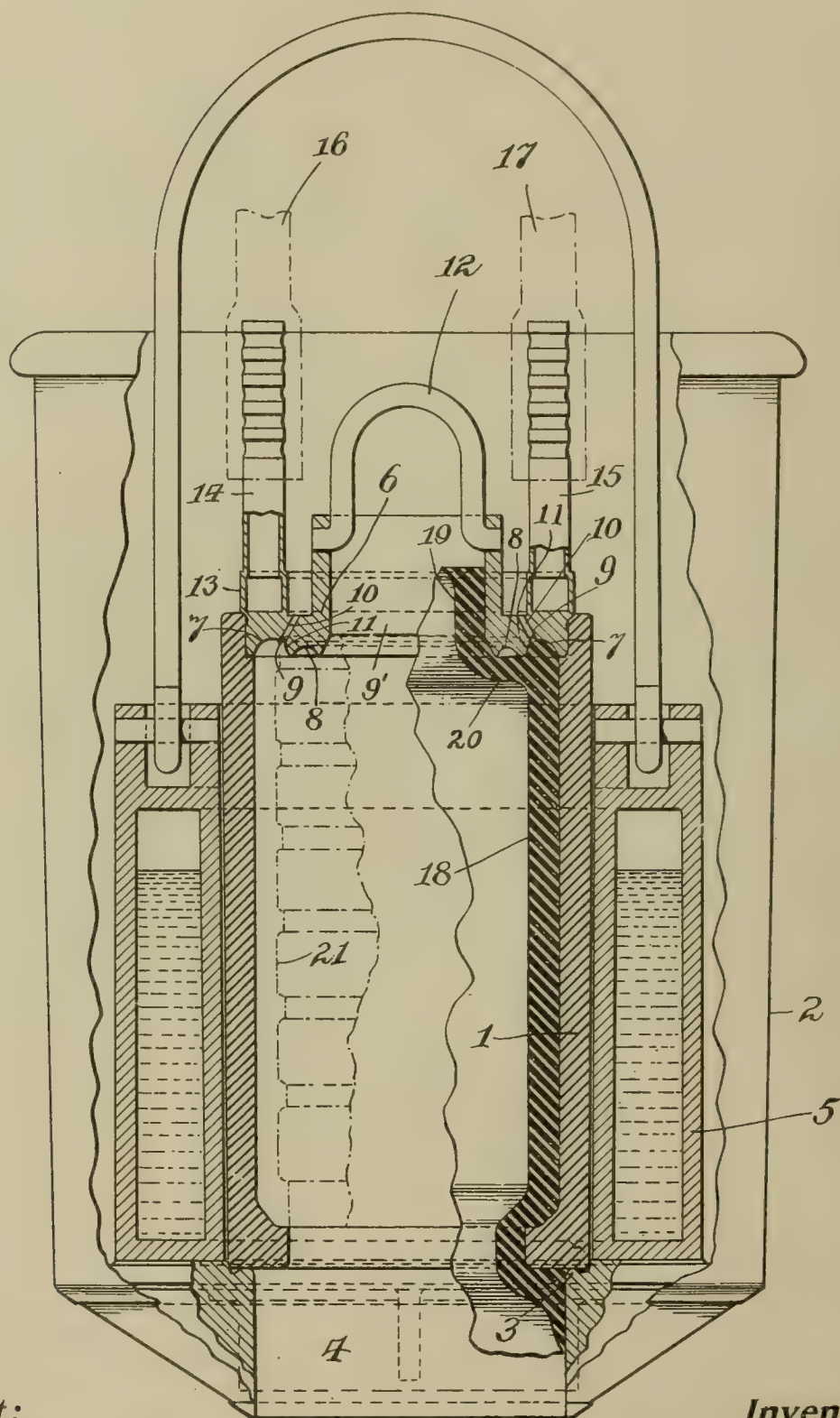
W. F. NEHR.

PRODUCTION OF PHONOGRAPHIC SOUND RECORDS.

APPLICATION FILED SEPT. 9, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

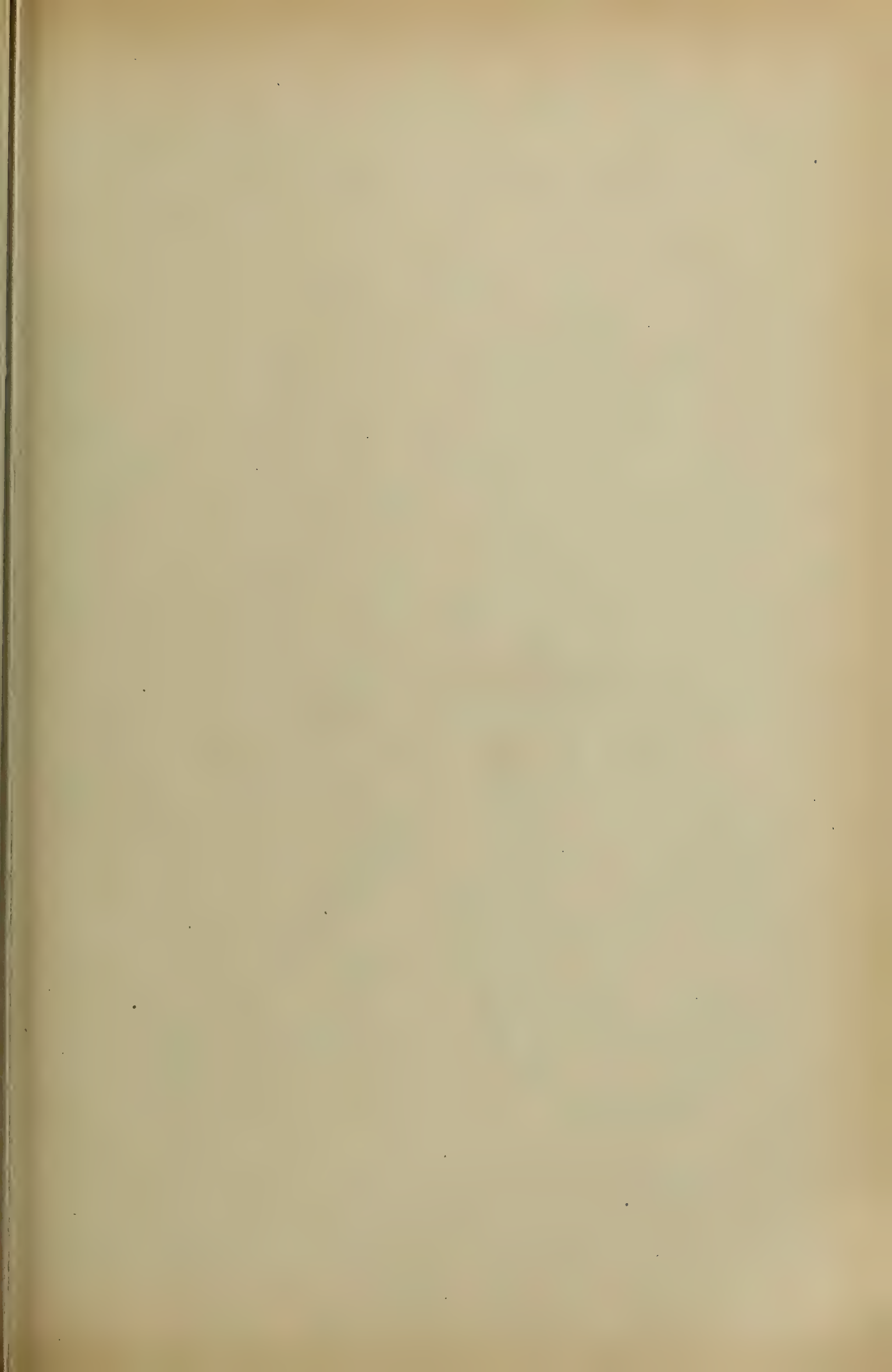


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Inventor:

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by *Frank L. Rye* Att'y.



W. F. NEHR.
 PRODUCTION OF PHONOGRAPHIC SOUND RECORDS.
 APPLICATION FILED SEPT. 9, 1905.

2 SHEETS—SHEET 2.

Fig. 2.

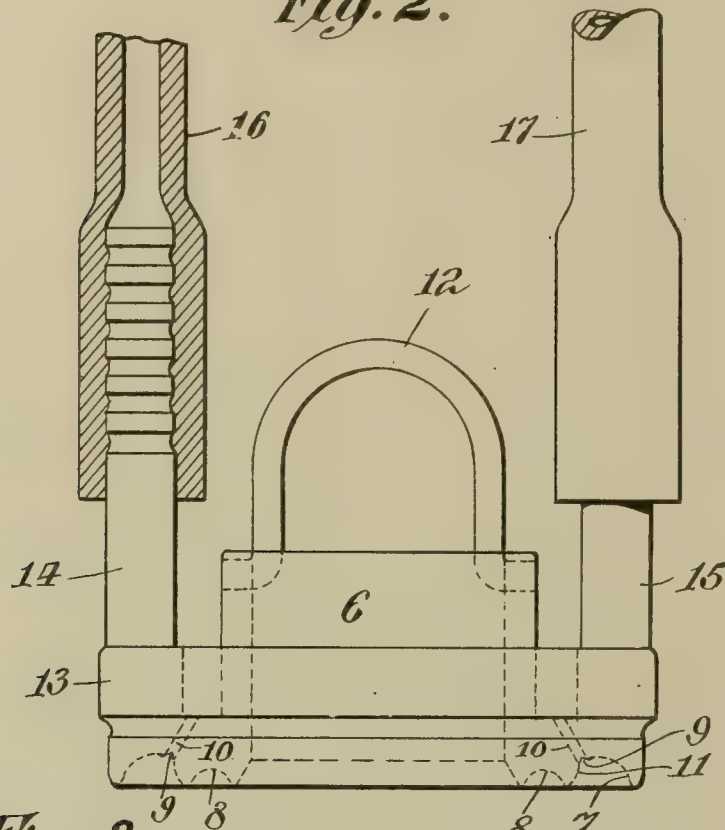


Fig. 3.

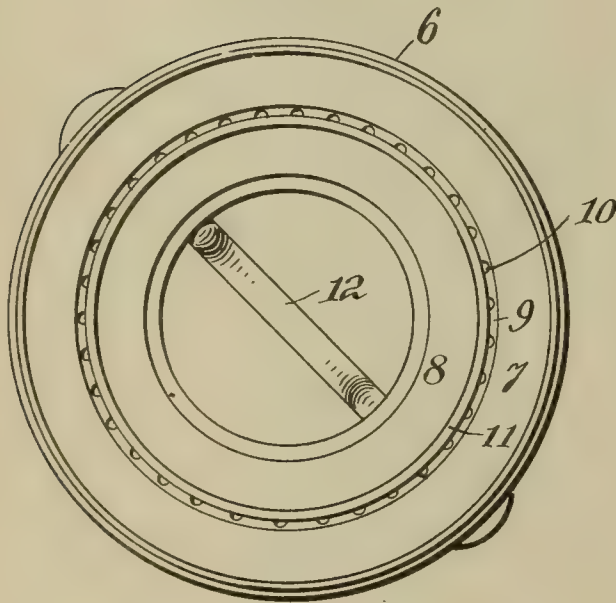
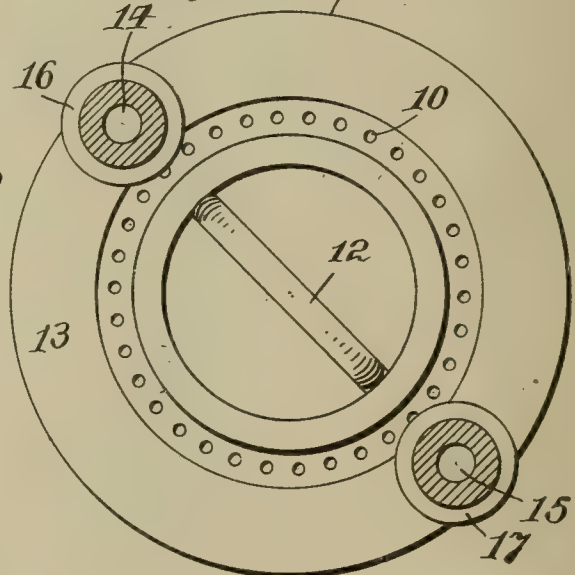


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM F. NEHR, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PRODUCTION OF PHONOGRAPHIC SOUND-RECORDS.

No. 834,485.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed September 9, 1905. Serial No. 277,800.

To all whom it may concern:

Be it known that I, WILLIAM FRANK NEHR, a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Production of Phonographic Sound-Records, of which the following is a description.

My invention relates to apparatus for use in the molding of phonographic sound-records, and more particularly to apparatus for carrying out a molding process described and claimed in United States Letters Patent No. 683,615, dated October 1, 1901, to Miller and Aylsworth, wherein a tubular mold is caused to descend into a bath of molten material, which fills the same and congeals upon its interior in a coating or layer, which adheres to the same while the mold is lifted out of the bath, after which the record may be finished upon its interior surface and removed from the mold by radial contraction or shrinkage.

Heretofore in producing records according to this process it has not been possible to mold the upper end of the record to the shape desired in the finished article, the practice being to form a rough end which must afterward be removed in any suitable manner, as by a cutter or trimmer of any suitable description.

My invention has for its object the provision of means whereby such upper end may be molded into a form suitable for the finished article—that is, a surface which will present a smooth and polished appearance and which will be free from depressions, elevations, discolorations, and all forms of roughness or irregularity. With this end in view I have made a large number of experiments to obtain a mold-cap which when placed upon a tubular coreless mold will be capable of molding the upper end of the sound-record in the manner referred to for an indefinite number of operations. From these experiments I have determined that the mold-cap should have a concave surface, the outer edge of which during the molding operation adjoins and forms a continuation of the bore of the mold. Preferably the body of the mold should extend above at least the lower part of said concave surface, so that when the cap is removed from the

mold the molded end of the record or that portion which forms the end after the reaming operation will be protected by the mold against accidental injury during the handling of the same prior to the removal of the finished article from the mold. I have also determined that the said concave surface may be of such form as to entrap a portion of the air contained in the bore of the mold as the same descends into the molten material, in which case the air is permitted to escape through air-holes extending through the body of the mold-cap. I have also obtained good results by providing a second groove concentric with the first groove and separated therefrom by a partition which tapers to a comparatively sharp edge. I have also discovered that the concave surface should be perfectly smooth and highly polished and preferably nickel-plated, and also that the mold-cap should be kept cool during the molding operation, as by providing the same with a water-jacket.

My invention consists in the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawings, in which—

Figure 1 is a vertical section showing a mold supported in a mold-carrier and surrounded by a water-jacket in the usual manner and provided with a cap constructed in accordance with my invention. Fig. 2 is an elevation, on an enlarged scale, of the mold-cap shown in Fig. 1. Fig. 3 is a bottom plan view of Fig. 2, and Fig. 4 is a top plan view of the same.

In all the views corresponding parts are designated by the same reference-numerals.

In carrying out the process of Patent No. 683,615, above referred to, the usual practice is to provide a tubular mold 1, carrying upon its interior surface a negative copy of the sound-record which it is desired to duplicate. This mold is open at the bottom to permit the molten material used for forming the duplicate to enter the mold, the mold being supported by a suitable carrier or support 2, which is provided with a seat 3 for the lower end of the mold and an opening 4 to allow the molten material to enter the mold. A removable water-jacket 5 surrounds the mold in order to keep the same at a temperature considerably below that of the

molten mixture. The parts thus described, speaking broadly, are well known in this art and form no part of my invention. The particular form of mold illustrated is believed to
 5 be novel, however, and is described and claimed in an application of Edward L. Aiken filed October 12, 1905, Serial No. 282,365.

The mold-cap 6 consists of a circular body of a size suitable to fit within the upper end
 10 of the mold 1 and close the same. The lower surface of this cap is provided with two circular grooves 7 and 8. A central opening 9 extends through the body of the cap. The outer surface of the groove 7 is so situated as
 15 to form a continuation of the interior surface of the mold 1. At the deepest portion of the groove 7 is a small V-shaped groove 9, and communicating with said groove 9 are a large number of air-holes 10, which extend
 20 through the body of the cap 6. The grooves 7 and 8 are separated by a web or partition 11, whose lower edge is comparatively sharp and occupies substantially the same horizontal plane as the outer edge of the groove 7
 25 and inner edge of the groove 8. The cap 6 may be constructed of any suitable metal or alloy, such as brass, and its entire lower surface is highly polished and nickel-plated, so as to present at all times a bright untarnished
 30 surface. The cap 6 is provided with a curved rod 12, by which it may be conveniently handled. The cap 6 is also provided with a water-jacket 13, preferably integral therewith, and is supplied with water
 35 through a flexible tube 16 and an inlet-pipe 14, the water leaving the jacket through an exit-pipe 15 and flexible tube 17.

In molding a record with the apparatus shown the temperature of the wax and the
 40 duration and immersion of the mold will be such that the mold will receive upon its interior surface a coating of congealed wax 18. Upon removing the mold from the bath of molten material the said coating adheres to
 45 the mold, and as soon as the wax has cooled sufficiently the cap 6 may be removed by a longitudinal movement and the neck 19 of the molded article may be removed by giving it a slight twist, whereupon it breaks off, gen-
 50 erally at or near the point 20. The interior of the record is then reamed out by a properly-shaped knife, while the wax is still soft, so that its interior surface assumes the shape indicated by dotted lines 21. It will be
 55 noted that the line 21 falls just outside of the groove 9 and air-holes 10, so that any impression which may have been produced by these parts will not appear upon the finished article. Furthermore, that portion of the
 60 congealed wax from which the record is formed is entirely within the body of the mold, so as to be protected thereby at all stages of manufacture.

After the reaming operation the record
 65 may be removed from the mold in an entirely

finished condition by cooling, thereby producing a relative contraction of the record with respect to the mold and then withdrawing the record from the mold by a longitudinal movement.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, a mold-cap provided with a circular groove rounded
 75 in cross-section and a water-jacket, substantially as set forth.

2. As a new article of manufacture, a mold-cap provided with adjacent concentric
 80 grooves, the outer groove having an air-passage extending through the body of the cap, substantially as set forth.

3. As a new article of manufacture, a mold-cap provided with a water-jacket and adjacent concentric grooves, the outer groove
 85 having an air-passage extending through the body of the cap, substantially as set forth.

4. As a new article of manufacture, a mold-cap provided with adjacent concentric
 90 grooves, the lower edges of the outer groove occupying substantially the same horizontal plane, substantially as set forth.

5. As a new article of manufacture, a mold-cap provided with adjacent concentric
 95 grooves the lower edges of said grooves occupying substantially the same horizontal plane, substantially as set forth.

6. As a new article of manufacture, a mold-cap provided with adjacent concentric
 100 grooves, the lower edges of which occupy substantially the same horizontal plane and the outer groove having an air-passage extending through the body of the cap, substantially as set forth.

7. As a new article of manufacture, a mold-cap provided with concentric grooves separated by a web which tapers to a comparatively sharp edge, substantially as set forth.

8. As a new article of manufacture, a mold-cap provided with concentric grooves separated by a web which tapers to a comparatively sharp edge, the outer groove having an air-passage extending through the body of the cap, substantially as set forth.

9. As a new article of manufacture, a mold-cap provided with a water-jacket and with concentric grooves separated by a web which tapers to a comparatively sharp edge, substantially as set forth.

10. As a new article of manufacture, a
 120 mold-cap provided with a water-jacket and with concentric grooves separated by a web which tapers to a comparatively sharp edge, the outer groove having a series of air-holes, substantially as described.

11. As a new article of manufacture, a mold-cap provided with a circular groove rounded in cross-section, the deepest portion of said groove being provided with a V-shaped groove and a series of air-holes ex-
 130

tending from said V-shaped groove through the body of the cap, substantially as set forth.

12. As a new article of manufacture, a mold-cap provided with a circular groove 5 rounded in cross-section and having a polished nickel-plated surface, substantially as set forth.

13. As a new article of manufacture, a mold-cap provided with adjacent concentric 10 grooves, the said grooves having polished nickel-plated surfaces, substantially as set forth.

14. As a new article of manufacture, a mold-cap provided with a circular groove 15 having a rounded, polished, nickel-plated surface and a series of air-holes extending therefrom through the body of the cap, substantially as set forth.

15. The combination of a tubular mold 20 and a removable circular mold-cap having a smooth concave surface, the outer edge of which forms a continuation of the bore of the mold, substantially as set forth.

16. The combination of a tubular mold 25 and a removable circular water-jacketed mold-cap having a smooth concave surface, the outer edge of which forms a continuation of the bore of the mold, substantially as set forth.

30 17. The combination of a tubular mold and a removable circular mold-cap having a

smooth concave surface, the outer edge of which forms a continuation of the bore of the mold, and an air-passage extending from said surface through the body of the cap, substan- 35 tially as set forth.

18. The combination of a tubular mold and a removable circular mold-cap having a polished, nickel-plated concave surface, the outer edge of which forms a continuation of 40 the bore of the mold, substantially as set forth.

19. The combination of a tubular mold and a removable circular mold-cap having a smooth concave surface, the outer edge of 45 which forms a continuation of the bore of the mold, the body of the mold extending above said concave surface, substantially as set forth.

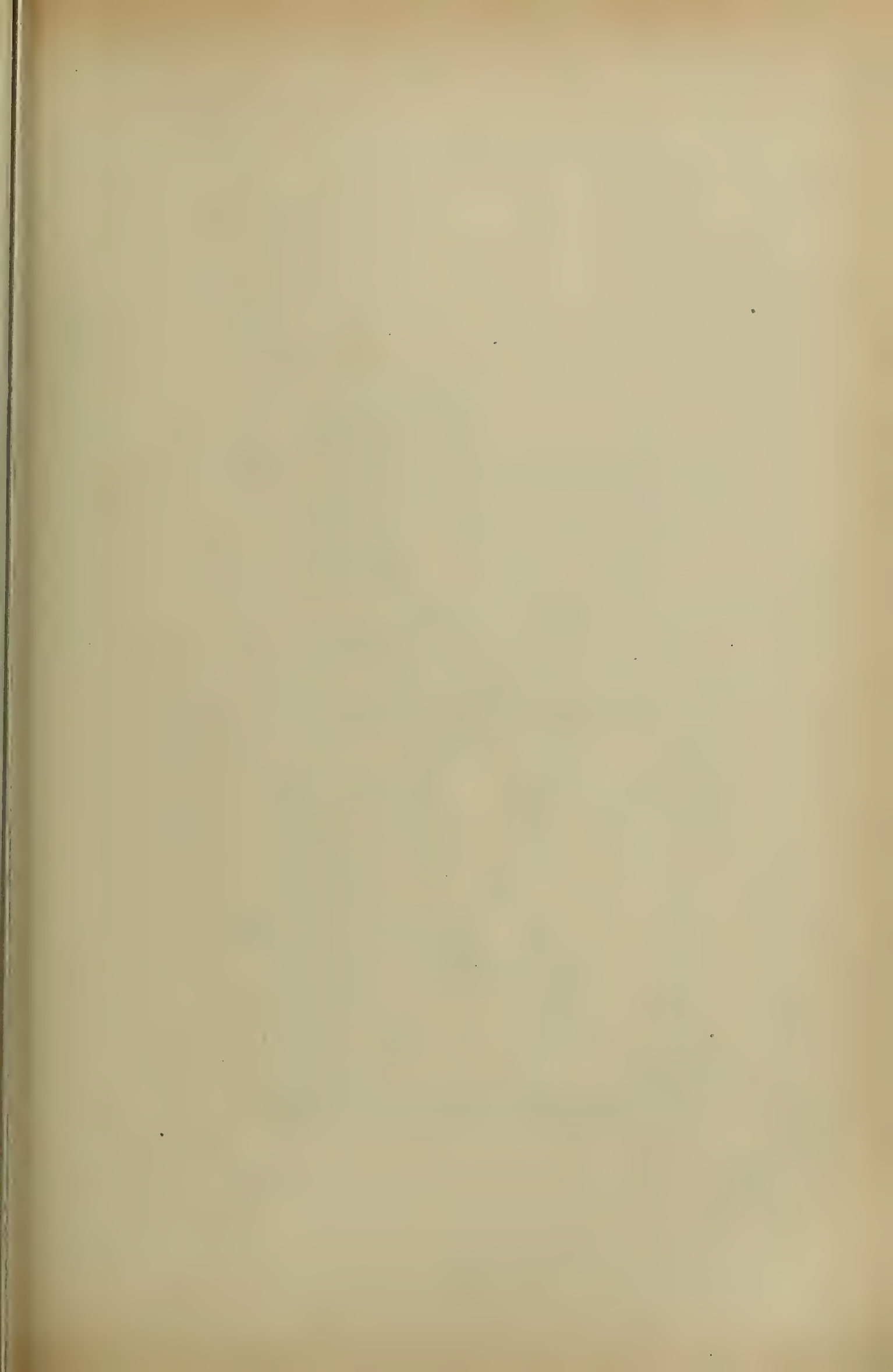
20. The combination of a tubular mold 50 and a removable circular mold-cap having a smooth concave surface, the outer edge of which forms a continuation of the bore of the mold, the body of the mold extending above at least the lower part of said concave sur- 55 face, substantially as set forth.

This specification signed and witnessed this 5th day of September, 1905.

WILLIAM F. NEHR.

Witnesses:

J. F. RANDOLPH,
DELOS HOLDEN.



No. 834,511.

PATENTED OCT. 30, 1906.

J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED NOV. 12, 1904.

2 SHEETS—SHEET 1

Fig 1.

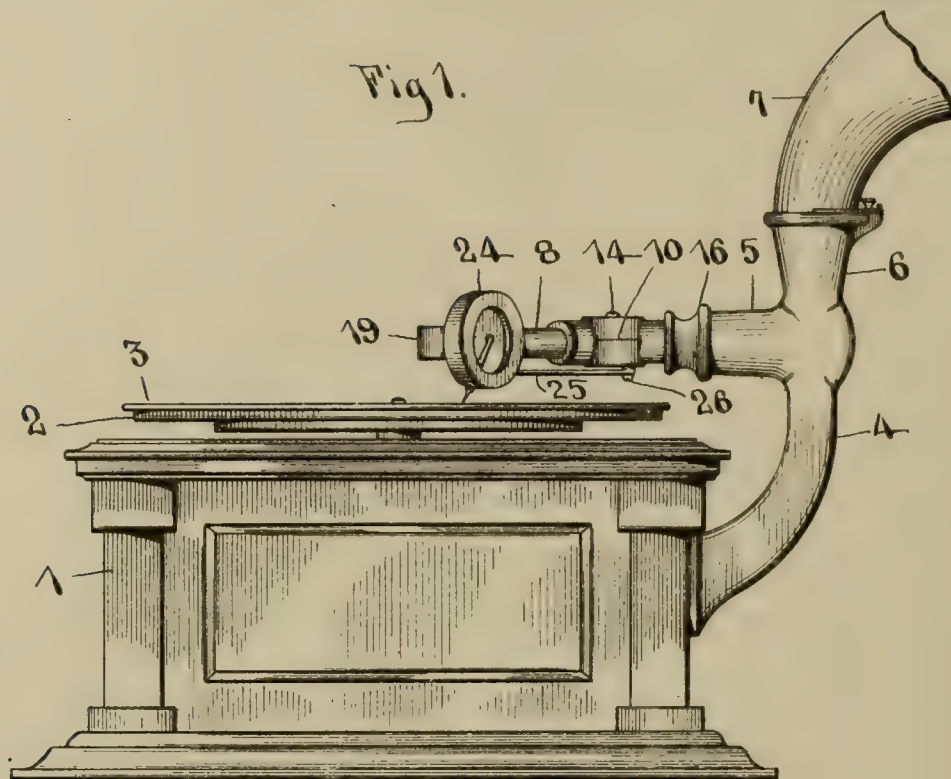
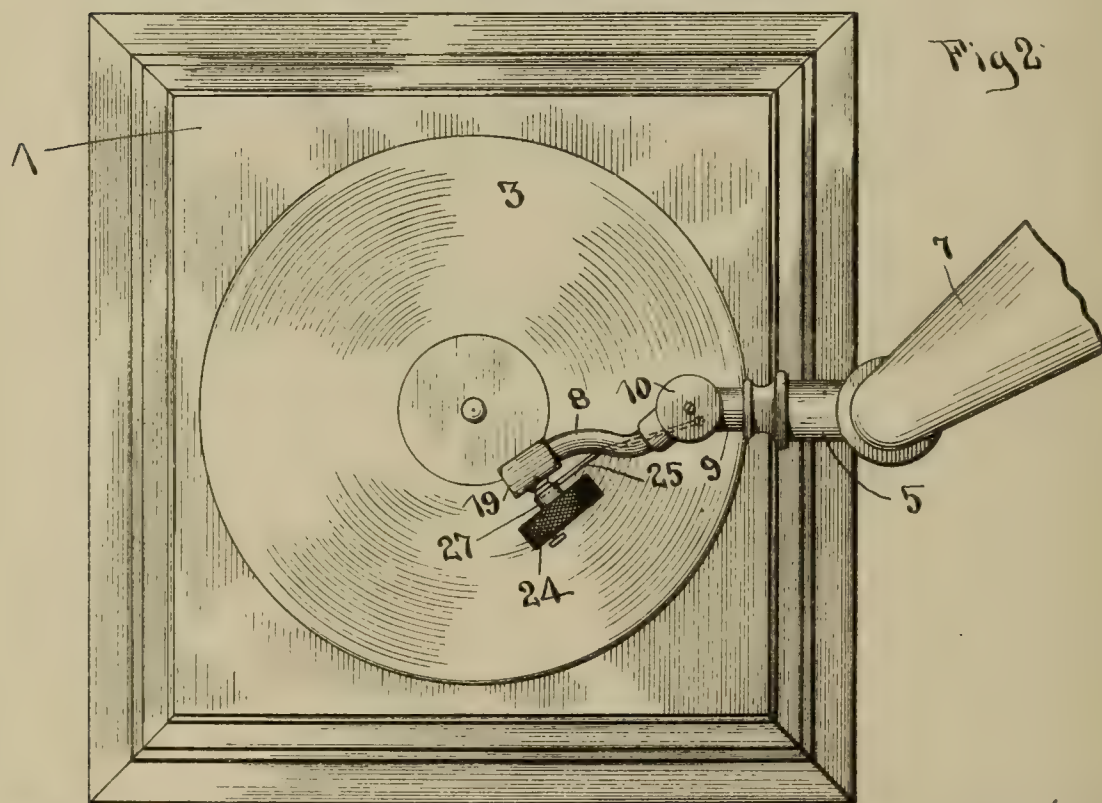


Fig 2.



WITNESSES:
F. J. Hartman
Edw. W. Vaill Jr.

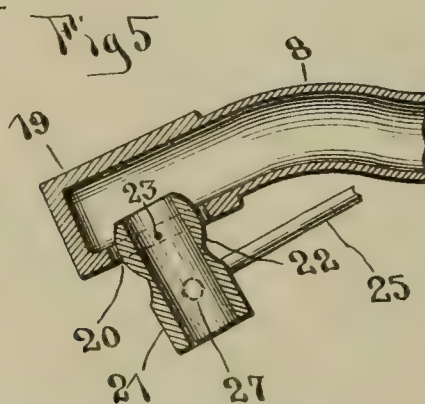
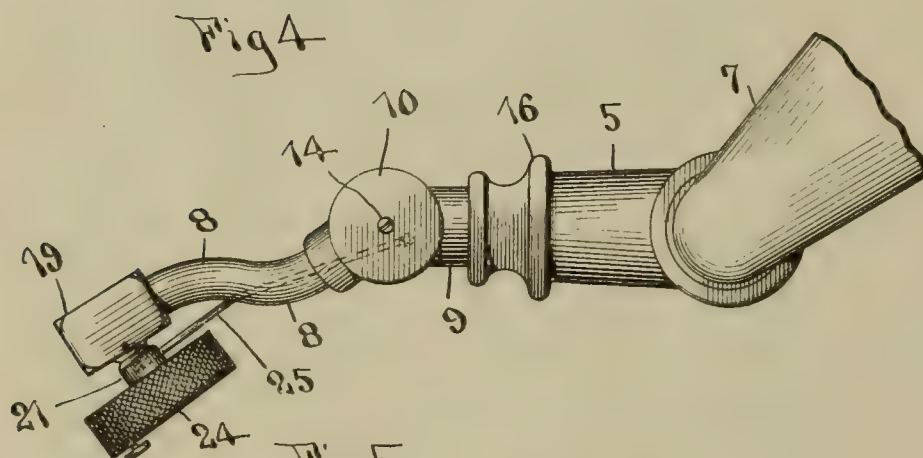
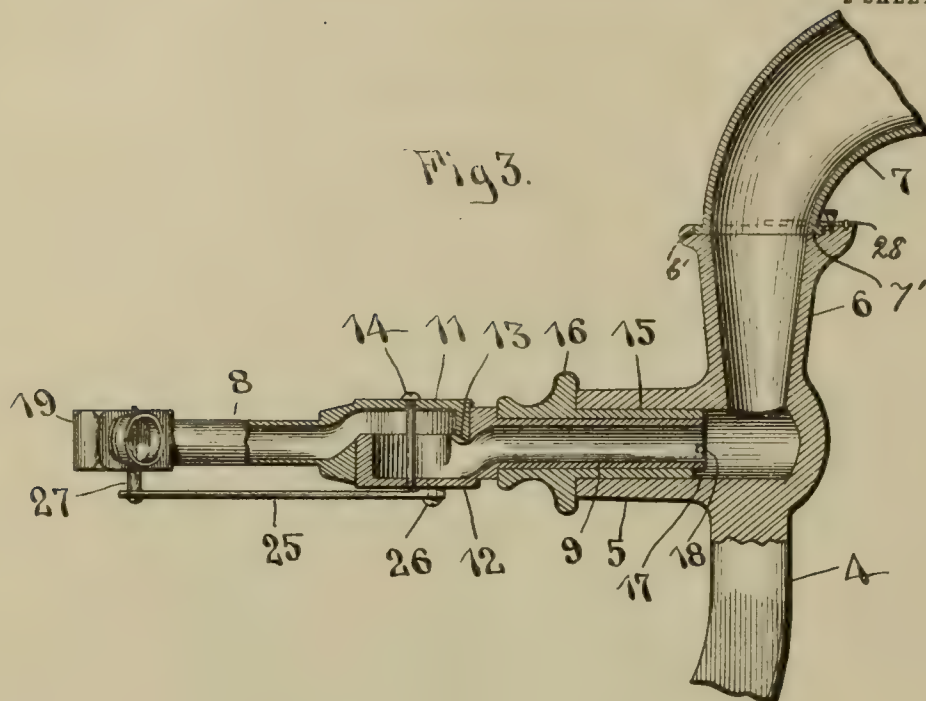
INVENTOR
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BY *Wm. P. Kelly*
ATTORNEY.

No. 834,511.

PATENTED OCT. 30, 1906.

J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED NOV. 12, 1904.

2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

No. 834,511.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed November 12, 1904. Serial No. 232,387.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide such a construction in connection with talking-machines or other similar sound recording and reproducing machines that the sound-box will at all times in traversing the grooves of the record be held accurately in such a position that the plane of the stylus or needle will be substantially tangent to the direction of rotation of a turn-table, and, therefore, tangent to the turns of the record-groove.

Heretofore in talking-machines the arm which supports the reproducing mechanism has usually been pivoted upon a vertical pivot, which causes the sound-box to swing in the arc of a circle about said pivot, and as the proper line on which the sound-box and needle should move in traversing a record of the disk type is a radius or straight line toward the center of the record it is evident that the stylus of the sound-box or reproducer in such former constructions would be in a plane tangent to the record-grooves at only one point in its movement across the record. This relation between the stylus or needle and the record-grooves seems to interfere somewhat with an accurate reproduction of the sounds recorded on the record, especially at the beginning and ending of the record, because the stylus-bar was not actuated in a direction exactly at right angles to the plane of the diaphragm.

My invention has substantially overcome this difficulty, and by its use the stylus is forced to move in substantially a straight line across the face of the record, said straight line being a radius, while at the same time the plane of the needle or stylus, as well as the sound-box diaphragm, are substantially in planes tangent to the record-groove on the radius referred to.

Briefly, my invention comprises an arm for supporting the reproducing mechanism which is composed of two parts jointed or pivoted together, the sound-box also being pivoted in relation to the parts of said supporting-arm, and also means for connecting

the sound-box with a fixed point, so that said sound-box is held accurately and firmly in its correct position while traversing the entire width of the record.

For a full, clear, and exact description of one embodiment of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which Figure 1 is a side elevation of a talking-machine, showing my improved device in use in connection therewith. Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal sectional view of the supporting-arm detached from the other parts of the machine and showing the manner of joining the sections of said arm. Fig. 4 is a detailed plan view of the same, and Fig. 5 is a sectional view showing the manner of forming the joint between the sound-box and the supporting-arm.

Referring to the drawings, the numeral 1 indicates a casing for the talking-machine motor, above which is revolubly carried the turn-table 2, adapted to receive the usual disk-record 3. At one side of the casing 1 is fixed an upwardly-extending arm or bracket 4, which has a horizontal tubular portion 5 connected therewith, and also a vertical tubular portion 6, recessed, as at 6', to receive the amplifying-horn 7, which is provided with a flanged end 7', adapted to be seated in the said recess 6'. A yoke or plate 28, secured to the upper end of the vertical tubular portion 6, embraces the upper surface of the flange 7' and, holding the horn in position within said recess 6', permits the horn to be swung horizontally about the upper end of said bracket 4.

The supporting-arm for the reproducer consists primarily of two hollow sections or tubes 8 and 9, which are jointed, as at 10, by means of two cylindrical boxes or casings 11 and 12, the first of which, 11, is open at its lower end and the latter of which is open at its upper end. The edges of said cylindrical portions are provided with inclined edges, as indicated at 13, which are held in contact with each other by means of a pivot-screw 14 or other similar device.

The part 9 of the reproducer-arm is surrounded by a sleeve or bushing 15, which is provided with a flange 16, adapted to abut against the end of the tubular projection 5. The inner end of the bushing 15 is provided

with an elongated notch or recess 17, the ends of which are adapted to form stops to limit the movement of a pin 18, carried by the tubular portion 9. This pin 18 prevents the section 9 of the supporting-arm from turning on its axis in either direction beyond certain limits. The outer end of the tubular part 8 is preferably provided with a slightly-enlarged rectangular portion 19, which has an opening 20 in one of the vertical sides thereof. Within this opening 20 is pivoted a short tube 21, which is provided on its inner end with a spherical portion 22, through the vertical axis of which passes a pivot-pin 23, said pivot-pin also entering the wall or side of the rectangular end 19 of the tubular part 8. The sound box or reproducer 24 is firmly attached to the short tube 21 in any suitable manner.

As means for giving the sound-box a positive horizontal movement in a direction transverse to its axis and to hold the same in the correct position in relation to the record-groove I provide a link 25, which is pivoted at one end to a fixed point, preferably on the stationary cylindrical portion 12 of the tubular part 9, as indicated at 26, and at its other end is pivotally attached to a short stud 27, projecting downwardly from the sound-box tube 21.

The positions of the pivot-screw 26 and the stud 27 in relation to the pivots 14 and 23 are such as to form substantially a parallelogram and to give a motion to the tube 22 similar to that produced in the instrument known as the "pantograph." However, the relation between the pivot just mentioned is not exactly a parallelogram, for it will be seen that if such were the case the sound-box and stylus carried thereby would still move in the arc of a circle about the pivot 14. These pivots are therefore arranged in such a manner and the parallelogram is distorted to such an extent as to produce a slight inward transverse movement of the stud 27 and the tube 21, which compensates for the curvature due to the motion of the tubular part 8 in the arc of a circle about the pivot 14. This is accomplished by making the horizontal distance between the pivot-pin 23 and the pivot-stud 27 slightly greater than between the pivot-screws 14 and 26 and also by adjusting the pivot-screw 26 in exactly the right position in relation to the pivot 14.

It will now be seen that when the stylus of the sound-box is placed, as is usually done, at the outer end of the spiral groove on the turn-table said groove will cause the sound-box to move inward toward the center of the record as the record revolves, and such movement, as far as the outer end 8 of the supporting-arm is concerned, will be about pivot 14; but by reason of the fact that the sound-box 24 is pivoted at 23 and also because the tube 21 is rigidly connected with a stationary

pivot 26 said sound-box and stylus or needle will be given just sufficient motion in a direction toward the pivot 14 as to compensate for the curvature of the arc, which would otherwise be described about the pivot 14. At the same time, owing to the movement of the sound-box about the pivot 23, the plane of the needle, and consequently the plane of the diaphragm, is always kept tangent to the record-groove at the point of contact of the end of stylus with said groove.

When it is desired to remove a needle from the stylus-bar or replace one there, the tubular part 9 may be rotated upon its axis within the sleeve 15, and the tubular part 8 will thereby be allowed to swing upwardly instead of horizontally. This will present the end of the stylus-bar in a convenient position to have a needle inserted or removed. The rotary motion of the tubular part 9 upon its axis is limited by a pin 18 in a direction when the sound-box is moved downwardly, as well as when raised. The sleeve 15 is made to fit snugly within the tubular projection 5, but is removable therefrom, so that the same may be withdrawn longitudinally and the whole reproducing-arm disconnected from the bracket 4.

Having thus described one embodiment of my invention, it will be seen that various changes may be made in the form, arrangement, and proportion of parts without departing from the spirit and scope of my invention, and it will be obvious that the means for giving the correct motion to the sound-box may be applied to supporting-arms which are not hollow, as well as to the tubular sound-conveying arm; but

What I claim, and desire to protect by Letters Patent of the United States, is—

1. In a talking-machine, the combination with a reproducer and pivoted reproducer-arm swinging in a plane parallel to the face of the record, of means for keeping the stylus of said reproducer substantially tangent with the record-groove as the said reproducer moves across the record.

2. In a talking-machine; the combination with a reproducer, of a swinging reproducer-arm to which said reproducer is pivoted, and means for moving said reproducer about its pivot so as to keep the plane of its stylus substantially tangent to the record-groove as the reproducer moves across the record.

3. In a talking-machine, the combination with a reproducer, of a jointed reproducer-arm having the reproducer pivoted adjacent the end thereof, and means for moving said reproducer upon its pivot so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

4. In a talking-machine, the combination with a reproducer, of a swinging reproducer-arm having the reproducer pivoted adjacent

the end thereof, and means connecting said reproducer with a fixed point for moving said reproducer upon its pivot so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

5. In a talking-machine, the combination with a reproducer, of a pivoted reproducer-arm having the reproducer pivoted adjacent the end thereof, means pivotally connected with the reproducer and with a fixed point adjacent the end of the pivot of said reproducer-arm for moving said reproducer about its pivot, so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

6. In a talking-machine, the combination with a reproducer, of a reproducer-arm, a portion of which is fixed and a portion of which is pivoted with the first-named portion, the pivoted portion of said arm having the reproducer pivoted adjacent the end thereof, and means connecting said reproducer and the fixed portion of said arm for moving said reproducer upon its pivot so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

7. In a talking-machine, the combination with a reproducer, of a hollow pivoted tube upon which said reproducer is pivotally mounted, said reproducer having a passage communicating with the interior of said arm, and means for moving said reproducer upon its pivot so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

8. In a talking-machine, with a reproducer, of a hollow jointed reproducer-arm, one portion of which is fixed in a suitable support, the free end of said arm having the sound-box pivotally connected with the end thereof, and having a passage communicating with the interior of said arm, and means for moving said reproducer upon its pivot, so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

9. In a talking-machine, the combination with a reproducer having a short tube connected therewith, of a hollow swinging reproducer-arm having said tube pivoted adjacent the end thereof, said tube having communication with the interior of said arm, and means pivotally attached to said tube, and to a fixed point for moving said reproducer about the pivot of said tube, so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

10. In a talking-machine, the combination with a reproducer, of a short tube attached thereto, of a hollow jointed reproducer-arm

having said tube pivoted adjacent the end thereof and having communication with said tube, and a link connecting said tube with the stationary portion of said hollow arm adjacent the axis of said joint for moving said reproducer upon its pivot, so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

11. In a talking-machine, the combination with a reproducer, of a hollow reproducer-arm, comprising two parts, the adjacent ends of said parts terminating in hollow cylindrical boxes having corresponding open ends, one of the parts of said arm having the reproducer pivotally connected therewith, and having the interior thereof in communication with the interior of the sound-chamber of the reproducer, and means connecting said sound-box with one of said cylindrical casings for moving the reproducer upon its pivot so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

12. In a talking-machine, the combination with a reproducer, of a hollow jointed reproducer-arm, a bushing surrounding one of the parts of said arm, rigid supporting means inclosing said bushing, and a stop, the parts of which are carried respectively by said arm and said bushing for limiting the rotary movement of said arm upon its axis.

13. In a talking-machine, the combination with a reproducer, of a hollow reproducer-arm having a joint therein, a fixed support for one part of said jointed arm, a lateral opening adjacent the free end of said arm, a short tube having a spherical end pivoted in said opening, said tube being adapted to carry the reproducer upon its opposite end, and means connecting said tube with the stationary portion of said arm for moving said reproducer upon its pivot, so that the plane of its stylus is maintained substantially tangent with the record-groove as the reproducer moves across the record.

14. In a talking-machine, the combination with a reproducer, of a pivoted reproducer-arm, a support pivoted to said arm to which the reproducer is attached, and a connection between said support and a fixed point, the relation between the pivot of said arm, the pivot of said support, and the ends of said connection forming substantially a parallelogram, so that said reproducer is maintained substantially tangent with the record-groove as the reproducer moves across the record.

15. In a talking-machine, the combination with a reproducer, of a hollow pivoted reproducer-arm, a short tube pivoted adjacent the free end of said arm, and having communication with the interior thereof, the reproducer being carried on the outer end of said tube, and a link pivoted at one end of said tube, and at its other end to a fixed point adjacent the

pivot of said hollow arm, the relative positions between said pivots and the pivoted ends of said link being substantially at the corners of a parallelogram, the outer end of which is slightly greater than the inner end so that said reproducer is maintained substantially tangent with the record-groove as the reproducer moves across the record.

16. In a talking-machine, the combination with a reproducer-arm and a bushing surrounding one end of said arm, of a fixed support having a tubular portion with which said bushing is adapted to telescope, and a second tubular portion communicating with the first, the end of said second tubular portion being recessed to receive and communicate with the end of the amplifying-horn and means for securing said horn within said recess.

17. In a talking-machine, the combination with a hollow reproducer-arm, of a fixed support having a tubular extension, a bushing carried by one of the parts of said arm, and within which said arm is rotatably mounted, said bushing being adapted to tightly fit within said tubular projection, an amplifying-horn, and a second tubular projection communicating with the first and adapted to hold and communicate with the end of said amplifying-horn.

18. In a talking-machine, the combination with a swinging or pivotally-mounted reproducer-arm and its coacting pivotally-mount-

ed record-propelled sound-box, of means for guiding the stylus in a radial path across the record-surface.

19. In a talking-machine, the combination of a sound-box carrier, comprising a rigid arm or bracket, an auxiliary arm pivotally attached to one end of said rigid arm, a sound-box pivotally mounted upon the outer end of said auxiliary arm, and a rod or link connected at its outer end with said sound-box, and at its inner end pivotally secured to said carrier near the pivotal point of the auxiliary arm but eccentric thereto.

20. In a talking-machine, the combination of a sound-box carrier, comprising a rigid hollow arm or bracket, an auxiliary hollow arm pivotally attached at one end to said rigid arm, and having communication therewith, a sound-box pivotally mounted upon the outer end of said auxiliary arm, and having communication therewith, and a rod or link connected at its outer end with said sound-box, and at its inner end pivotally secured to said carrier near the pivotal point of said auxiliary arm but eccentric thereto.

In witness whereof I have hereunto set my hand this 10th day of November, 1904.

JOHN C. ENGLISH.

Witnesses:

JOHN F. GRADY,
HARRY COBB KENNEDY.

No. 834,629.

PATENTED OCT. 30, 1906.

E. H. MOBLEY.
DIAPHRAGM FOR TRANSMITTING SOUND WAVES.
APPLICATION FILED SEPT. 17, 1903.

Fig. 1.

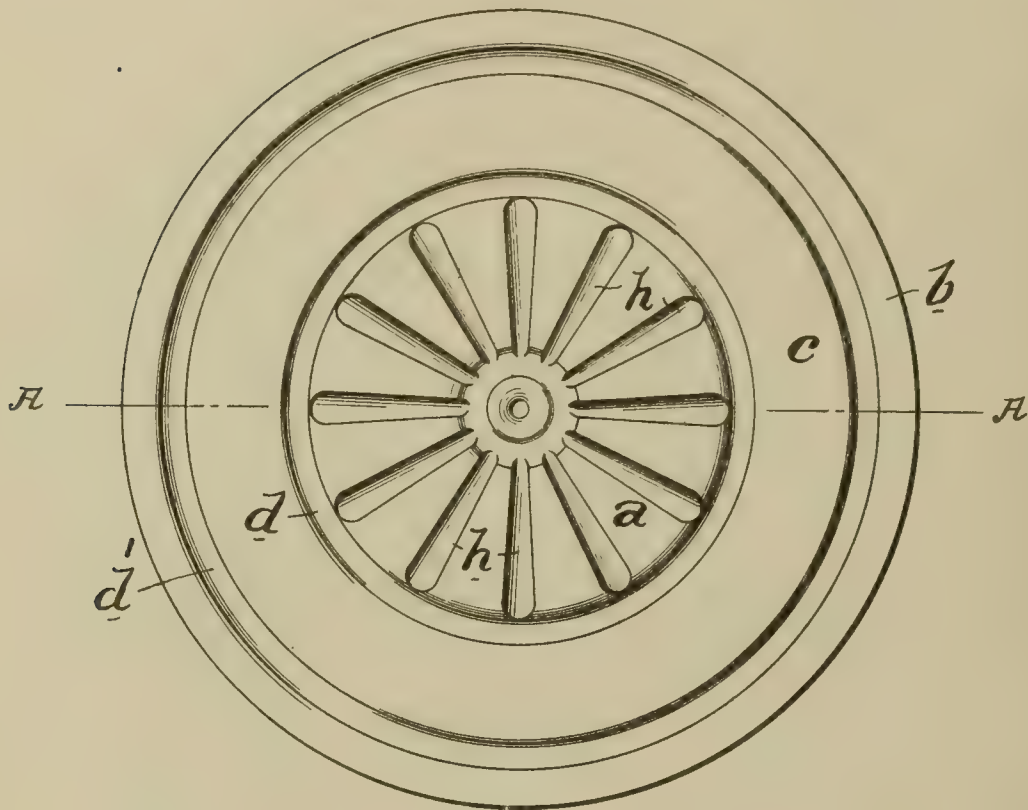
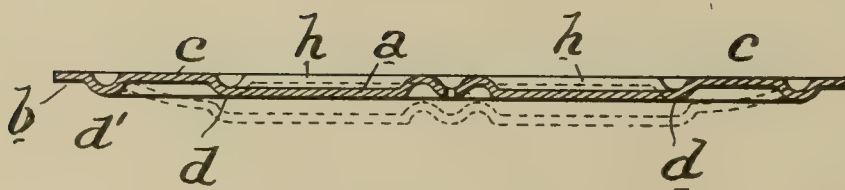


Fig. 2.



WITNESSES:

Dan'l Webster, Jr.
A. W. Stellwag.

INVENTOR

Edwin H. Mobley

BY

[Signature]
Attorney

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF MORTON, PENNSYLVANIA.

DIAPHRAGM FOR TRANSMITTING SOUND-WAVES.

No. 834,629.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed September 17, 1903. Serial No. 173,501.

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, of Morton, Delaware county, State of Pennsylvania, have invented an Improvement in
5 Diaphragms for Transmitting Sound-Waves, of which the following is a specification.

One of the difficulties which has been met in preserving the clearness and distinctness as well as the natural tone or "timbre" of
10 sounds transmitted by vibratory diaphragms has been due to the fact that, owing to the construction of the diaphragm, it assumes a more or less curved or arched position while vibrating under the action of the sound-
15 waves, which results in the deflection of the sound-waves and their consequent interference with one another.

If the diaphragm, or that portion of it which is effective in the transmission of the
20 sound-waves, vibrates in the plane of its surface, or without curvature in the diameter of its plane, the waves will not be deflected, but will be transmitted in direct lines. While this result can and possibly has been ob-
25 tained in diaphragms of special construction where the central vibratory portion has been connected with the clamping edge or outer support by separate connecting-springs, such constructions are unsatisfac-
30 tory not only because of their complicated and expensive construction, but also because the openings afforded by these spring connections permit a portion of the sound-waves to pass through without acting on the dia-
35 phragm. Not only are such sound-waves lost, but the openings permit air-currents to pass through, which affect the sound-waves transmitted by the vibrations of the dia-
phragm.

40 It is the object of my invention to provide a diaphragm composed of a single integral sheet without openings or attenuated portions in which the central part may vibrate under the action of the sound-waves without
45 appreciable curvature in the lines of its diameter or plane of its surface.

The diaphragm is formed of a thin sheet of strong resilient material, having its central portion united with the clamping edge by
50 an integral, continuous, and unattenuated spring portion of substantial width, so that the central portion is strengthened or stayed against curvature and the radial movements necessary to permit the vibrations are taken
55 up in the integral uniting spring portion.

The diaphragm may be used in any instru-

ment for transmitting sound-waves, such as the reproducing and recording heads of phonographs, graphophones, and gramophones, and the sound-boards and tympana of mu-
60 sical instruments.

In the drawings, Figure 1 is a plan view of a diaphragm embodying my invention. Fig. 2 is a transverse section of the same.

The diaphragm is composed of a thin disk
65 or sheet of metal or other suitable material having the necessary strength and resiliency. It is of uniform thickness throughout the body, and the central portion *a*, by which the vibrations are transmitted, is connected with
70 the outer edge *b*, by which the diaphragm is clamped in place, by an integral spring portion *c*. This spring portion *c* is of substantial width, so as to allow for sufficient movement during the vibration of the central por-
75 tion to enable the said central portion to maintain a flat uncurved surface. This is illustrated in dotted lines in Fig. 2, from which it will be seen that the radial motion is taken up entirely in the portion *c*, and the
80 central operative part *a* is not arched or bent, as is the case with integral diaphragms as they have heretofore been constructed. The practical effect of thus maintaining the
85 central portion of the diaphragm in a flat uncurved condition during its vibrations is to transmit the sound-waves at right angles to the face of the diaphragm and not to deflect them laterally, as would be the case if they
90 were transmitted by a curved or arched surface. By reason of this the sounds transmitted are more clear and distinct and their natural quality or timbre is more perfectly preserved.

d is an annular corrugation about the center
95 of the diaphragm at a substantial distance from the outer edge, and *h* represents a series of radial corrugations extending from the center of the diaphragm to said annular corrugation. These radial corrugations form the
100 central stiffened vibratory portion, and the spring portion *c* is between the annular corrugation *d* and the outer edge. A second annular corrugation *d'* may be formed near the
105 outer edge, the spring portion *c* being the flat uncorrugated annulus between said corrugations *d* and *d'*.

Attention is particularly directed to the fact that the diaphragm is composed of a single integral piece of uniform thickness and
110 that the spring connection between the central portion and supporting edge, which pre-

serves the flat position of the central portion during the vibrations, is formed without weakening or reducing the metal.

The diaphragms may be stamped or
5 spun up.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. A diaphragm for transmitting sound-
waves consisting of a thin sheet of strong re-
10 silient material, having an annular corruga-
tion near the outer edge, a smaller annular
corrugation within said outer corrugation,
and a series of radial corrugations extending
from the center of the diaphragm to said
15 smaller annular corrugation, said small annu-
lar corrugation and radial corrugations form-
ing a central stiffened vibratory portion, and
the annular portion between said annular

corrugations forming a resilient connecting
portion between the stiffened center and the 20
outer edge

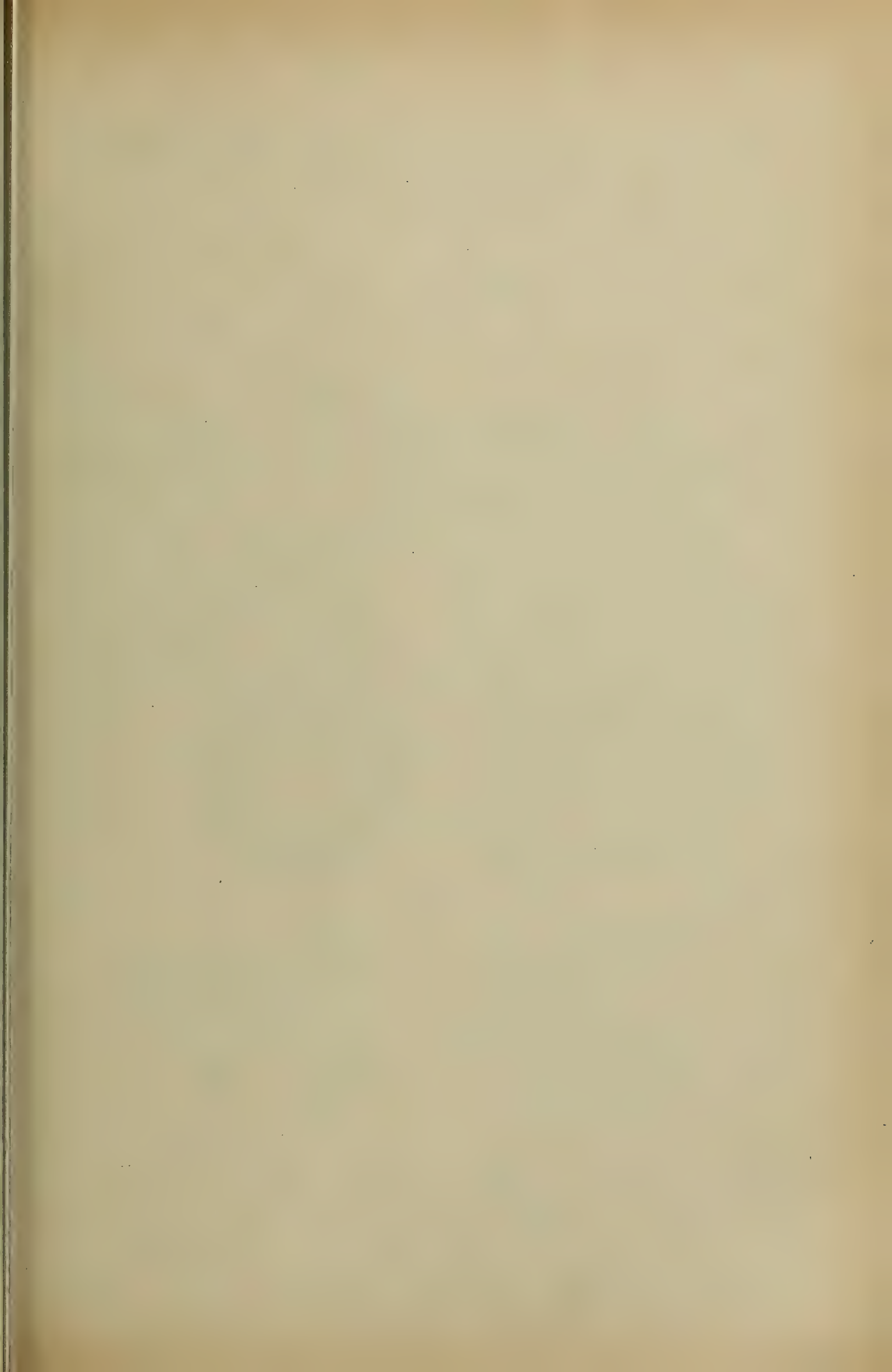
2. A diaphragm for transmitting sound-
waves consisting of a thin sheet of strong re-
siliant material having an annular corruga-
tion about the center at a substantial dis- 25
tance from the outer edge, and a series of ra-
dial corrugations extending from the center
of the diaphragm to said annular corruga-
tion, said corrugations forming a central stiff-
ened vibratory portion. 30

In testimony of which invention I here-
unto set my hand.

EDWIN H. MOBLEY.

Witnesses:

ERNEST HOWARD HUNTER,
M. J. EYRE.



No. 835,338.

PATENTED NOV. 6, 1906.

E. WEISLOWITS.
SEPARABLE PHONOGRAPH HORN.
APPLICATION FILED NOV. 23, 1905.

Fig. 1.

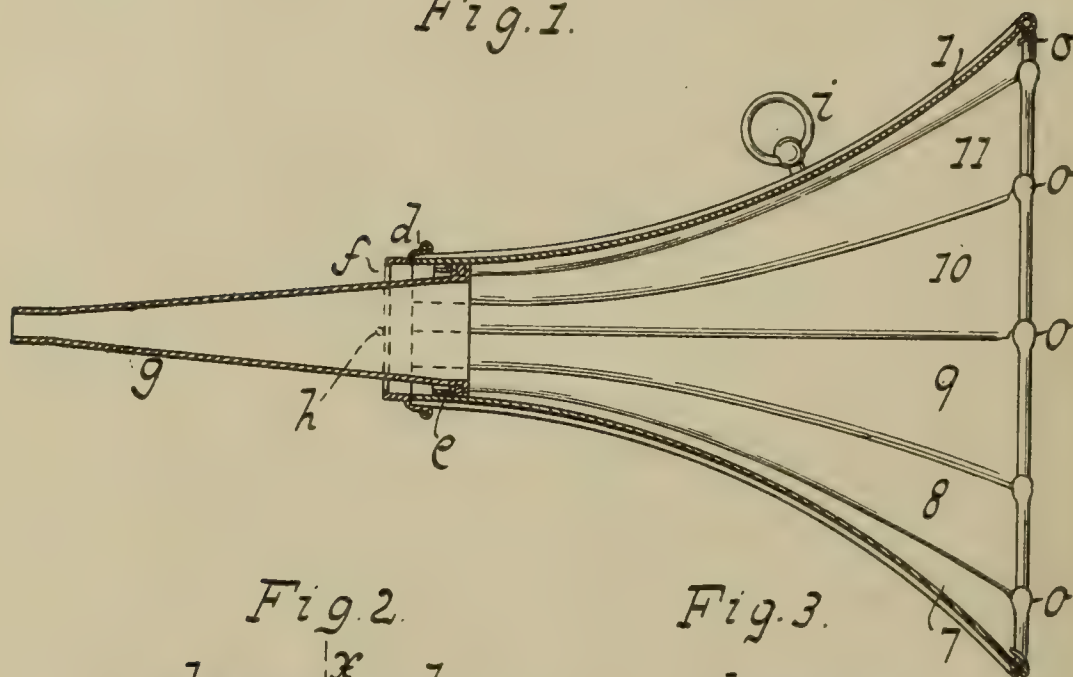


Fig. 2.

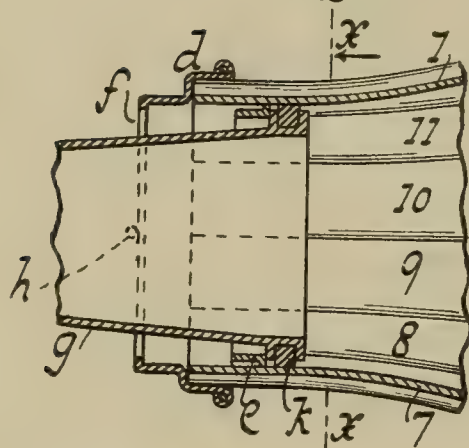


Fig. 3.

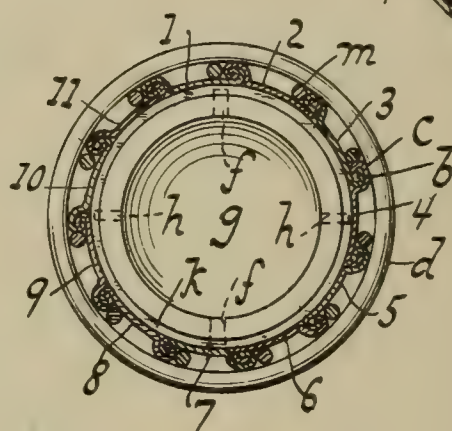


Fig. 4.

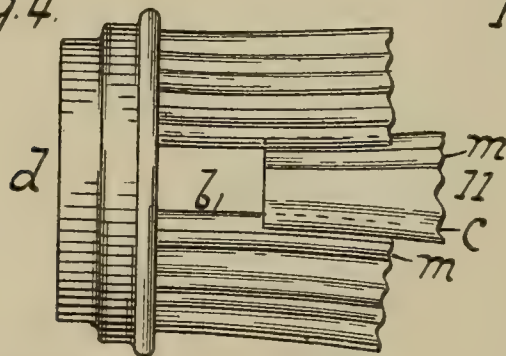
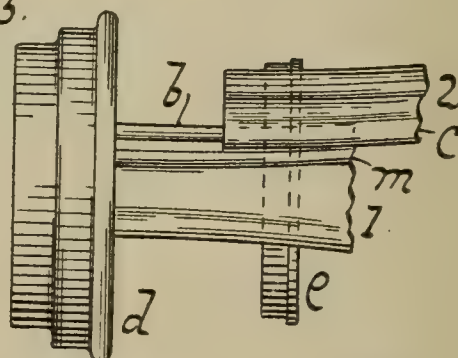


Fig. 5.



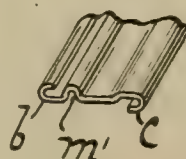
WITNESSES:

William Miller
Edward Kiesner

Fig. 6.



Fig. 7.



INVENTOR

Edward Weislowits

BY

W. C. Hauff
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD WEISLOWITS, OF NEW YORK, N. Y., ASSIGNOR TO NETTE WEISLOWITS, OF NEWARK, NEW JERSEY.

SEPARABLE PHONOGRAPH-HORN.

No. 835,338.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed November 23, 1905. Serial No. 288,760.

To all whom it may concern:

Be it known that I, EDWARD WEISLOWITS, a citizen of the United States, residing in Manhattan borough, in the county of New York and State of New York, have invented new and useful Improvements in Separable Phonograph-Horns, of which the following is a specification.

This invention enables a horn to be brought to practically flat condition or its elements or sections to be slipped apart and superposed to occupy but little space.

This invention is set forth in the following specification and claims, and illustrated in the annexed drawings, in which—

Figure 1 is a longitudinal section of a horn embodying this invention. Fig. 2 is an enlarged view of part of Fig. 1. Fig. 3 is a section along *x x*, Fig. 1. Fig. 4 shows a horn element or section partly out of place or not slipped fully home. Fig. 5 is a view of two sections or horn elements partly engaged. Fig. 6 is a detail. Fig. 7 shows a modification.

The horns or sound-throwing trumpets used in connection with phonographs take up considerable room. Particularly in transporting or carrying the instrument about the horn is more or less of an incumbrance.

According to this invention the horn is composed of readily-separable elements or sections. Eleven such elements are shown in the drawings, consecutively numbered; but the number is immaterial.

Each element has at one edge a channel *b* and at the other a bead *c*. Each element having its bead slid into a channel of an adjoining element at one edge and the bead of the opposite element being in its turn slipped into the channel of the first-named element, and so on, the horn is built up. These elements are tapered as required for the horn or funnel shape.

Element 1 has soldered or secured thereto a ring *d* at its narrow or rear end. Element 2 has at the small end a ring *e*. When elements 1 and 2 are slipped together, these two rings come concentric to one another with a certain space between the rings. Into this space pass the tail or narrow ends of the other elements 3 to 11 as they are slipped or pushed into place. The ring *d* is flanged at its narrow end, and this flange has cuts, as seen at *f*, Fig. 3.

A funnel-shaped tube *g* has a suitable catch—as, for example, pins *h*. The tube is passed small end first into the large end or mouth of the horn when built up and through the rings, the pins *h* passing through cuts or slits *f*, and a turn is then given to lock the tube and horn on the plan of a bayonet-joint. These parts can thus be easily connected or disconnected.

One of the elements—for example, 1—can have an eye or suspending ring *i*, as generally applied for supporting the horn when in use.

The tube is shown with a flange or shoulder at which is a packing *k*, such as a rubber ring. When this flange sits against ring *e*, the packing makes tight closure against the horn 1 to 11 or its inner side.

When the sections are pulled apart, they can be laid flat upon one another and packed into small compass.

At each bead *h* the respective element or horn-section has a guide *m*, which, according to Fig. 6, might be a piece of wire; but, as seen in Fig. 7, the guide could also be formed by suitably pressing or bending part of the stock or sheet-metal pieces composing the elements.

At the front or mouth end of the horn the sections are shown with stops or alining laps *o*, which when the parts are assembled or slipped together arrest the parts in line or with the tail or inner end portions properly in place between the rings. These laps or stops *o* can be made of any desirable form or finish.

The horn when dismembered can be carried in a small compass, such as a narrow box with handle. Any suitable catch or fastening for the tube can be used in place of the bayonet-joint shown. All such variations are included in the invention, such as variations of size, material, and the like.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A phonograph-horn comprising sections or elements adapted to be slipped and form engagement with one another, two of the sections having concentric rings between which parts of the other sections can enter or sit.

2. A phonograph-horn comprising separable sections, a ring on the end portion of one of the sections, and a tube adapted to be

detachably connected to the ring, said tube being made to form a continuation of the horn and having a packing or ring for tight closure against the assembled horn elements.

5 3. A phonograph-horn comprising separable sections, a ring on one of the sections, and a tube, said ring and tube having a bayonet-joint or separable connection.

10 4. A phonograph-horn comprising sections, concentric rings fastened one each to two of the sections, and a tube having a flange adapted to sit against one of the rings, and having a stud or pin for engaging another of said rings.

15 5. A phonograph-horn, comprising a plurality of elements adapted to detachably engage with one another and each of which is provided at one end with an alining stop, the stop carried by one element projecting over
20 and engaging the adjacent element.

6. A phonograph-horn comprising a plurality of interengaging detachable sections, each of said sections provided at one side with a channel extending in the direction of
25 the length thereof and further provided with a guide in close proximity to the channels, and each of said sections further having its opposite side provided with a bead extending in the direction of the length thereof, said
30 bead adapted to engage in the channel of an adjoining section.

7. A phonograph-horn comprising a plurality of interengaging detachable sections, one of said sections having fixedly secured
35 thereto and projecting from one end thereof a ring adapted to receive the corresponding ends of the other sections, and a tube adapted to be detachably connected to the said ring.

40 8. A phonograph-horn comprising a plu-

ality of interengaging detachable sections, one of said sections having fixedly secured thereto and projecting from one end thereof a slitted ring adapted to receive the corresponding ends of the other sections, and
45 adapted to be adjustably connected to said ring and provided with a pin.

9. A phonograph-horn comprising a plurality of interengaging detachable sections, one of said sections having fixedly secured
50 thereto and projecting from one end thereof a ring, another of said sections having fixedly secured near one end thereof a ring arranged in advance of the other ring, forming thereby
55 a space between the rings into which the ends of the other sections are positioned, and a tube adapted to be detachably connected to one of said rings and bearing against the other of said rings.

10. A phonograph-horn comprising a plurality of interengaging detachable sections, one of said sections having fixedly secured
60 thereto and projecting from one end thereof a ring, another of said sections having fixedly secured near one end thereof a ring arranged
65 in advance of the other ring, forming thereby a space between the rings into which the ends of the other section are positioned, and a tube provided with a flange carrying a packing, said tube adapted to be detachably con-
70 nected to one of said rings, bearing against the other of said rings and having the packing engaging the inner face of said sections.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
75 witnesses.

EDWARD WEISLOWITS.

Witnesses:

GEORGE HULSBERG,
EDWARD WIESNER.

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT,
A CORPORATION OF WEST VIRGINIA.

SOUND-REPRODUCER.

No. 835,544.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Application filed March 27, 1906. Serial No. 308,362.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Sound-Reproducers, which improvement is fully set forth in the following specification.

This invention has reference to the construction of sound-reproducers for use with sound-records of the varying-depth type. Such reproducers have heretofore been constructed so that the reproducer as a whole or the stylus-carrying member thereof is pivoted and rests by gravity on the sound-record. This gravity-reproducer has certain well-known utilities, such as adjusting itself to and faithfully tracking the sound-groove and bearing with uniform pressure upon the tablet. These results are practically indispensable to successful sound-reproduction.

Efforts have heretofore been made to substitute spring tension for the weight and at the same time secure the above-mentioned indispensable results. So far as I am aware, these efforts have not been entirely successful from a commercial standpoint, since the structures were either too complicated for use in the hands of any but skilled experts or else were too expensive to manufacture, and in some instances both of these objections obtained.

The object of the present invention is to secure by the use of spring tension the same practical results heretofore obtained by the use of a weight, while at the same time providing a structure which is simple in operation and may be cheaply constructed.

The inventive idea involved in the present invention may find some variety of mechanical expression, but, generally speaking, it consists in combining with the diaphragm and a stylus connected therewith a pin journaled to turn in the frame of the reproducer in a plane approximately perpendicular to the diaphragm, which pin carries a spring tending to press the stylus against the sound-record. This affords a structure that may be cheaply manufactured, is perfectly simple in operation, and is thoroughly effective since

the spring and all the connected parts move with the pin, which is journaled in the frame, as above described.

Furthermore, the present invention not only secures high efficiency in sound-reproduction, but it results also in an economical and durable construction. The floating weight is dispensed with and its place is taken by a relatively light plate to which the stylus-bar is pivoted. Moreover, the spring acts when the reproducer is not in use to hold the supporting-plate firmly against a stop, thereby preventing rattling and greatly diminishing the liability to injury. A reproducer of the improved construction can operate at one angle to the horizon as well as at another, whereas the ordinary gravity-reproducer will only operate advantageously at the particular angle for which the weight has been calculated.

In the best form in which the invention has thus been applied the reproducer and diaphragm have no movement perpendicular to the tablet, the stylus being pivoted to a supporting-plate hinged so as to move perpendicularly to the tablet and the spring being applied to this supporting-plate. When the reproducer is brought into its operative position, the pressure of the stylus on the tablet lifts the supporting-plate from its rest or stop and puts the spring under tension or compression, as the case may be.

The spring is attached not to a fixed part of the frame, but to a pin or bar which is hinged or swiveled to turn on an axis at right angles (or approximately so) to the diaphragm. The stylus is pivoted to this same bar, so that the spring being carried entirely by the swinging part of the reproducer has no tendency to force the reproducing-point out of the sound-groove. On the contrary, experiment shows that the construction herein described gives better results in tracking than reproducers previously in use.

In the accompanying drawings, which form part of this specification, Figure 1 is a sectional view through the center of the diaphragm, illustrating a reproducer constructed in accordance with the invention. Fig. 2 is a bottom plan view thereof. Fig. 3 is a par-

tial end view of the hinge. Fig. 4 is a detail of the guard and stop. Fig. 5 is a view in cross-section of a modified form of the mounting. Fig. 6 is a detail in section of the hinge thereof.

The frame 25 and diaphragm 26 of the reproducer are or may be of ordinary construction. The stylus-lever 8 is pivoted to a stud 9, attached to the supporting-plate 10, the latter being hinged at 12 to a pin 28, which is journaled in a tube or bushing 29, screwed into the frame 25. Supporting-plate 10 is therefore pivoted so as to turn freely on an axis substantially at right angles to the diaphragm. Stylus-lever 8 is connected to the diaphragm by a flexible connection 13, as usual. Hinge-pin 28 has a downward projection 30, to which is attached one end of spiral spring 16, whose other end is attached to plate 10. This spring tends to hold the stylus in contact with the sound-record, but being carried entirely by the swinging part of the reproducer it has no tendency to force the stylus out of the sound-groove. Hinge-pin 28 has an elongated bearing in tube 29, so as to prevent binding due to the pull of the spring. The top of tube or bushing 29 is closed by a screw 31.

Figs. 5 and 6 illustrate a modified construction of the hinge. Pin 28 instead of being journaled in the tube 29 is pivoted at its ends between centers 32 33. One of these centers passes through the top of tube 29 and the other through a strap 34, attached to the frame 25 and passing under pin 28, which has a bend or offset at this point. This construction gives the result of the elongated bearing with less friction than the construction shown in Figs. 1 and 2.

The free end of hinged plate 10 has a pin 14, which projects through a hole in guide-plate 15. This hole is of ample width to afford free lateral play to the plate. The upper side of this hole is made V-shaped to guide the swinging parts to a central position when raised by the lifting-cam. This insures the proper position of the stylus when dropped upon the record.

The frame 25 of the reproducer which carries the diaphragm is attached to the usual carriage 35, and in this case the attachment is a rigid one, so that the diaphragm is not movable toward and from the sound-record except in response to vibratory motions of the stylus. The lifting-cam 7 acts upon the tailpiece 36 of plate 10, lifting the latter (and the stylus with it) without moving the diaphragm and its support.

The mounting herein described has advantages even when the pressure of the stylus against the sound-record is due entirely to gravity.

Having thus described my invention, I claim—

1. In a sound-producer, the combination with the diaphragm and stylus-lever connected therewith, of a support to which said stylus-lever is pivoted, a hinge-pin journaled at approximately right angles to the diaphragm, said stylus-support being pivoted directly to said pin, and a spring attached at one end to said pin and at the other to said support.

2. In a sound-reproducer, the combination with the diaphragm, of a stylus-lever attached thereto, a supporting-plate to which said stylus-lever is pivoted, a pin having bearings in the frame of the reproducer approximately at right angles to the diaphragm, said plate being pivoted to said pin so as to move freely toward and from the sound-record, and means carried wholly by the swinging part of the reproducer for pressing the stylus against the sound-record.

3. The combination with the diaphragm, of a stylus connected therewith, a supporting-plate to which the stylus is attached, a hinge-pin having an elongated bearing in the frame, said plate being pivoted directly to said pin, and means carried wholly by said pin for pressing the stylus against the sound-record.

4. The combination with the diaphragm, of a stylus connected therewith, a supporting-plate for said stylus, a hinge-pin having an elongated bearing in the reproducer-frame, said plate being pivoted directly to said pin, and a spring attached at one end to said pin and at the other to said plate.

5. The combination with the diaphragm and stylus connected therewith, of a pin journaled in the frame approximately perpendicular to the plane of the diaphragm, and a spring carried by said pin and tending to press the stylus against the sound-record.

6. The combination with the diaphragm and stylus connected therewith, of a pin journaled in the frame approximately perpendicularly to the diaphragm, a support for said stylus pivoted directly to said pin and movable toward and from the sound-record, a spring carried by said pin and pressing said stylus toward the sound-record, and means for lifting said stylus against the pressure of said spring without moving the diaphragm.

7. The combination with the diaphragm and stylus connected therewith, of a pin journaled in the frame approximately perpendicularly to the diaphragm, a support for said stylus pivoted directly to said pin and movable universally independently of said diaphragm, means for lifting said support, and a guide for centering said support and stylus when lifted.

8. In a sound-reproducer, a frame, a diaphragm supported therein, a pin at right an-

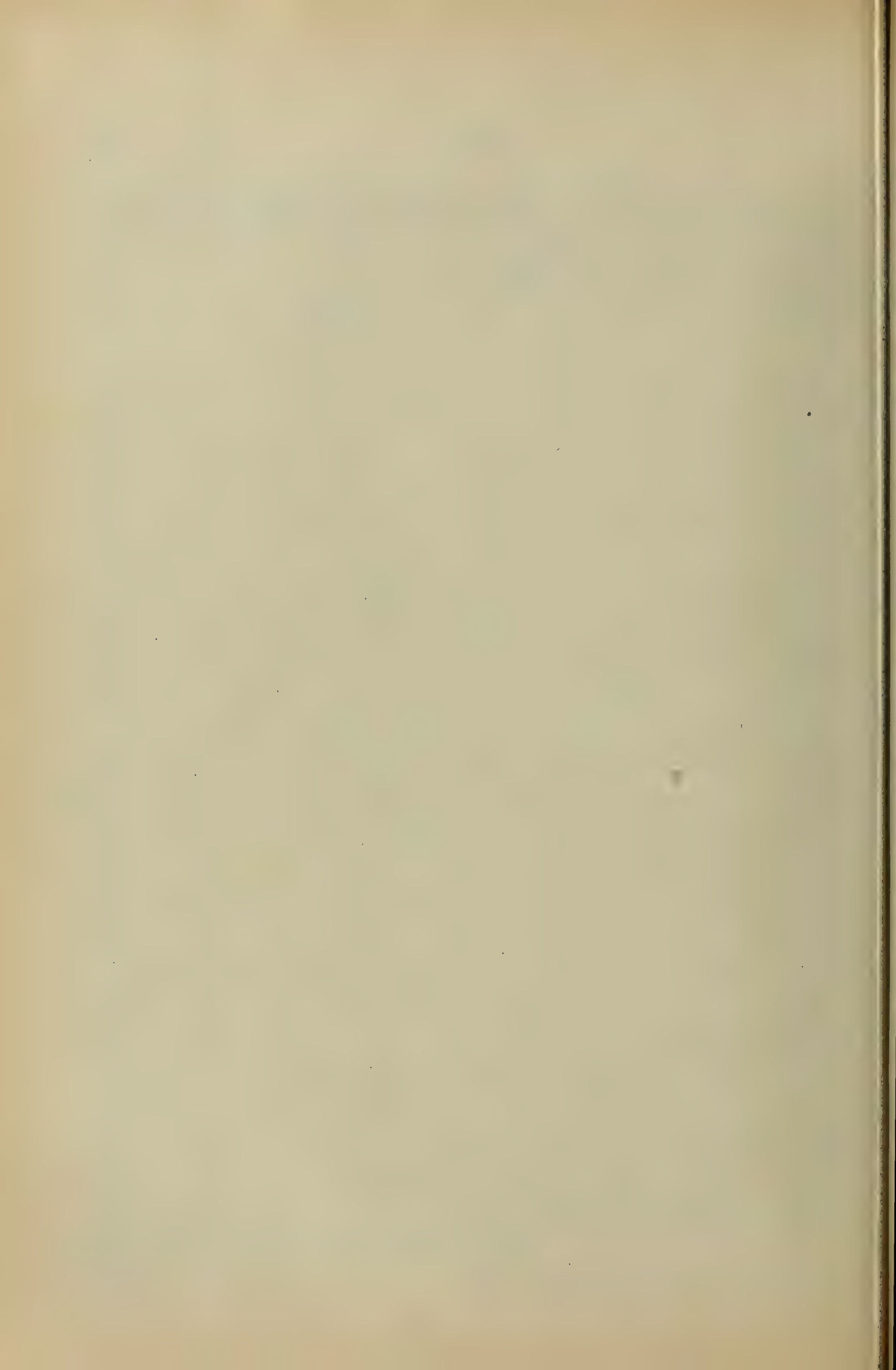
gles to the plane of the diaphragm and jour-
naled to turn in the frame at a point exterior
to the periphery of the diaphragm, a plate
pivoted to said pin, a stylus supported by
5 said plate and connected to said diaphragm,
and a spring carried by said pin and acting on
said plate to hold the stylus in contact with
the record.

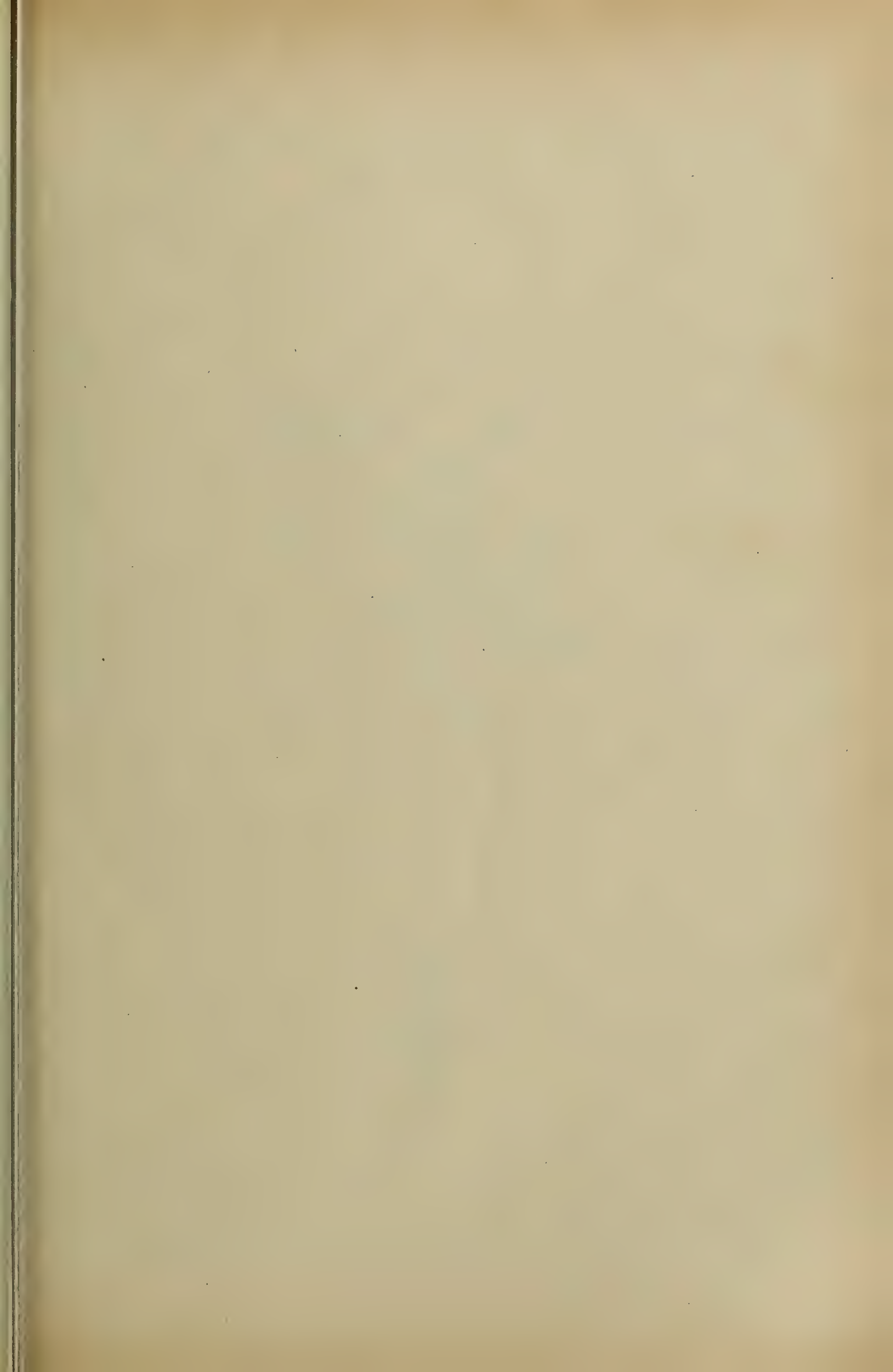
In testimony whereof I have signed this
specification in the presence of two subscrib- 10
ing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
C. A. GIBNER.





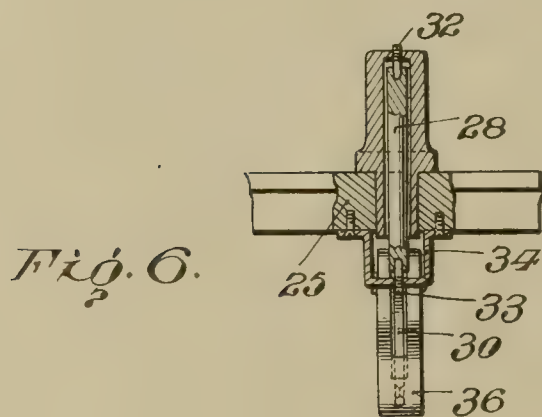
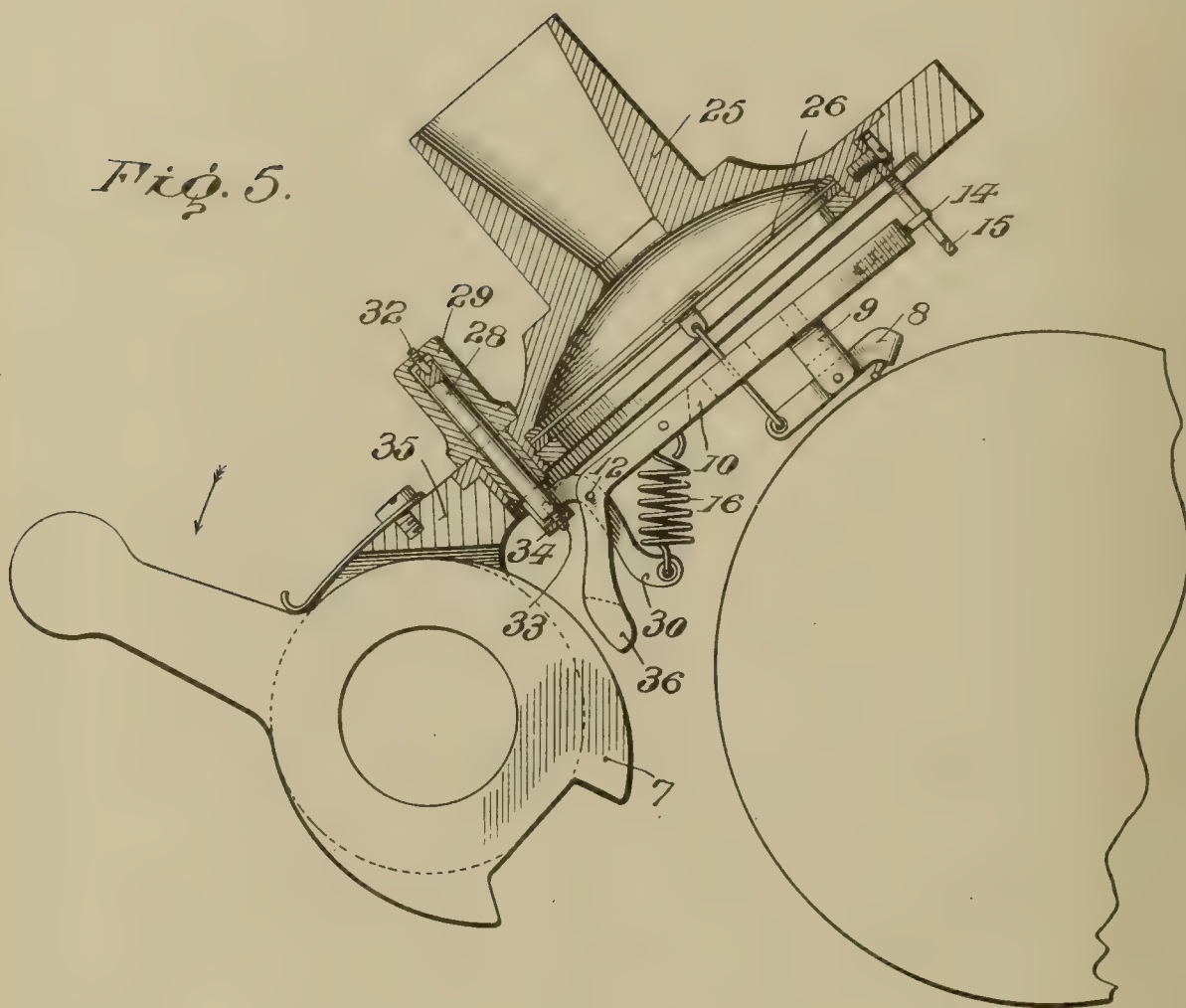
No. 835,544.

PATENTED NOV. 13, 1906.

T. H. MACDONALD.
SOUND REPRODUCER.

APPLICATION FILED MAR. 27, 1906.

2 SHEETS—SHEET 2.



Inventor

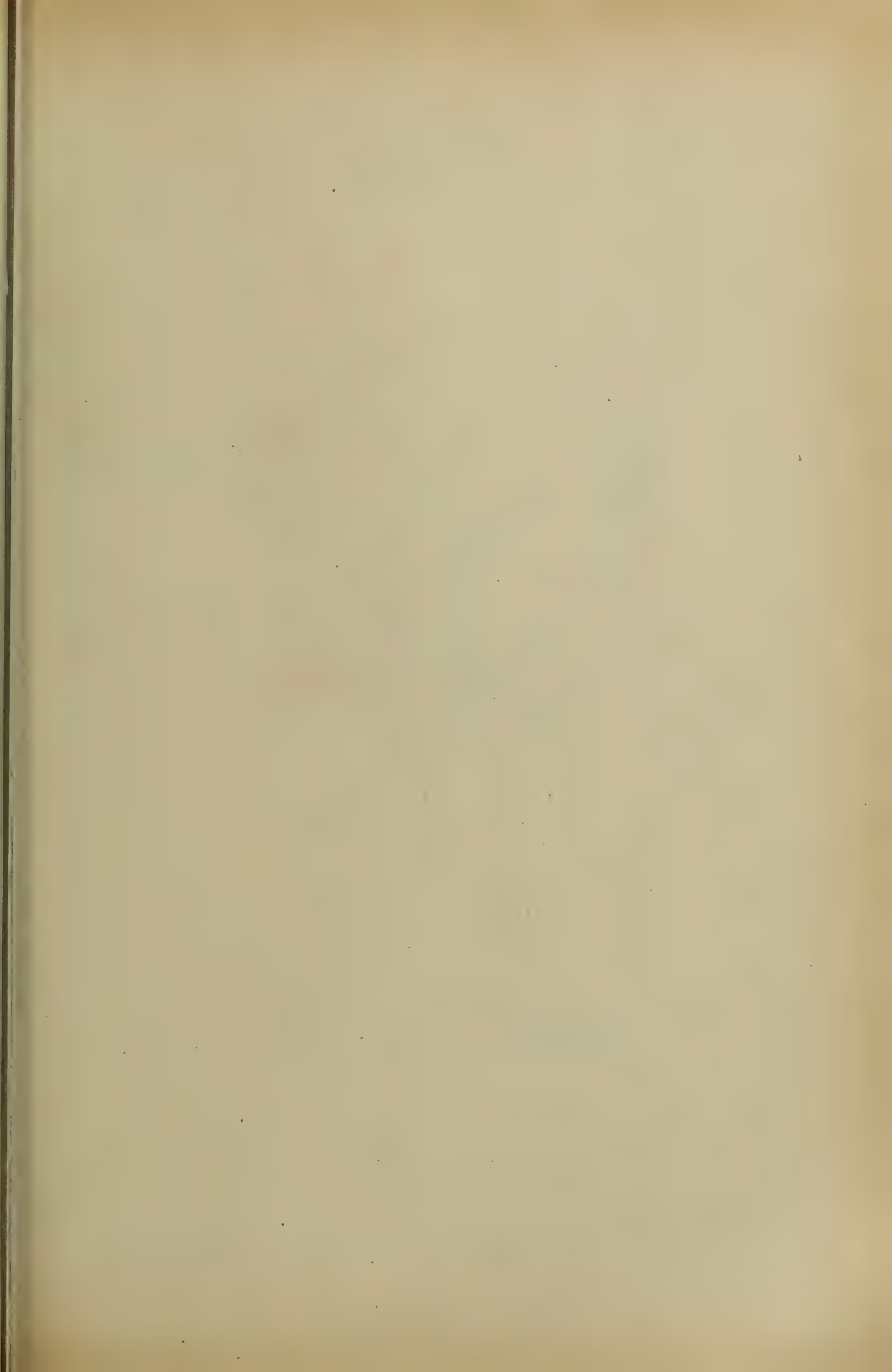
Witnesses

Gustave R. Thompson.
Ruth C. Fitzhugh.

Thomas H. Macdonald,

By

Mauro, Cameron, Lewis & Massie,
Attorneys



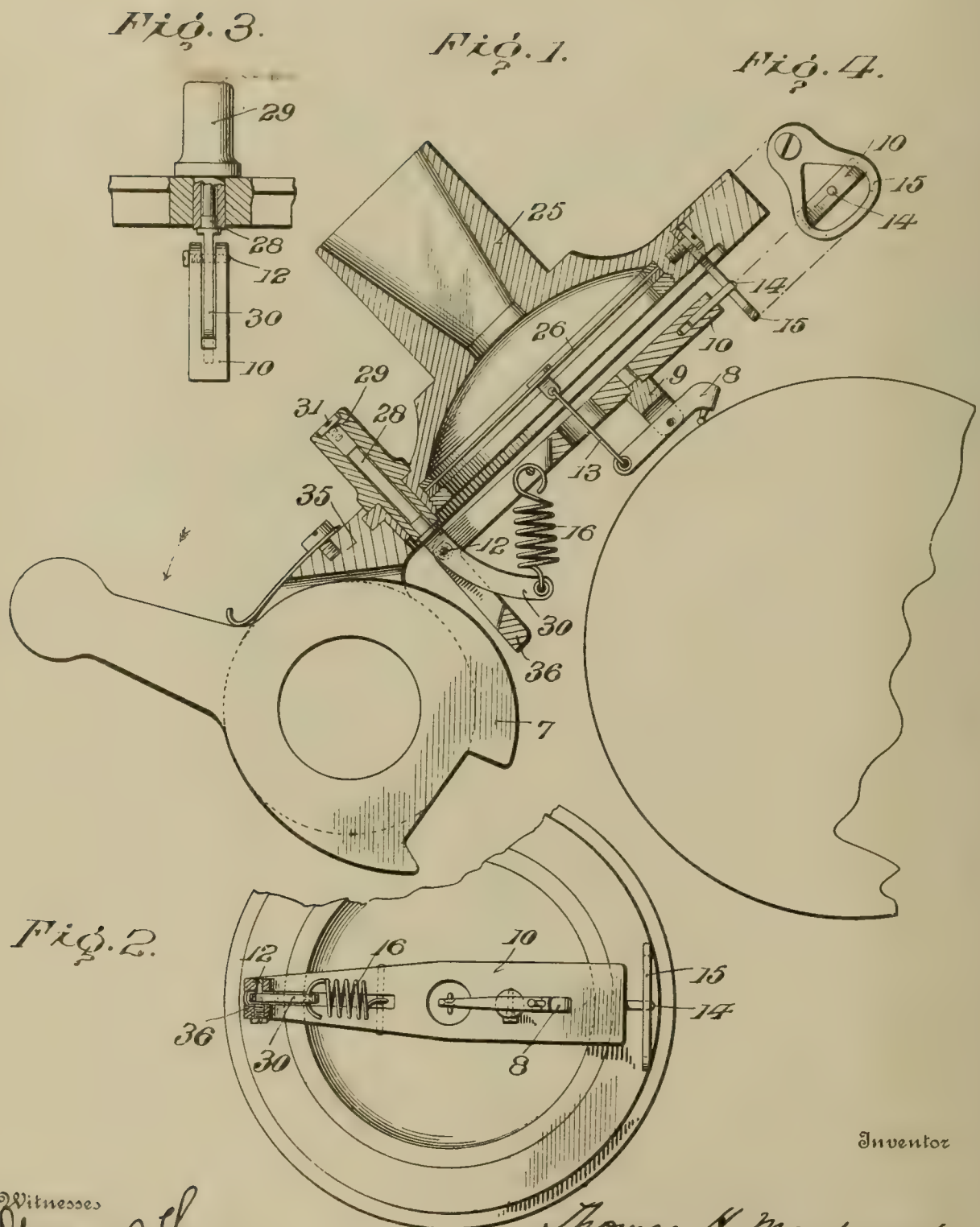
No. 835,544.

PATENTED NOV. 13, 1906.

T. H. MACDONALD.
SOUND REPRODUCER.

APPLICATION FILED MAR. 27, 1906.

2 SHEETS—SHEET 1



Inventor

Witnesses

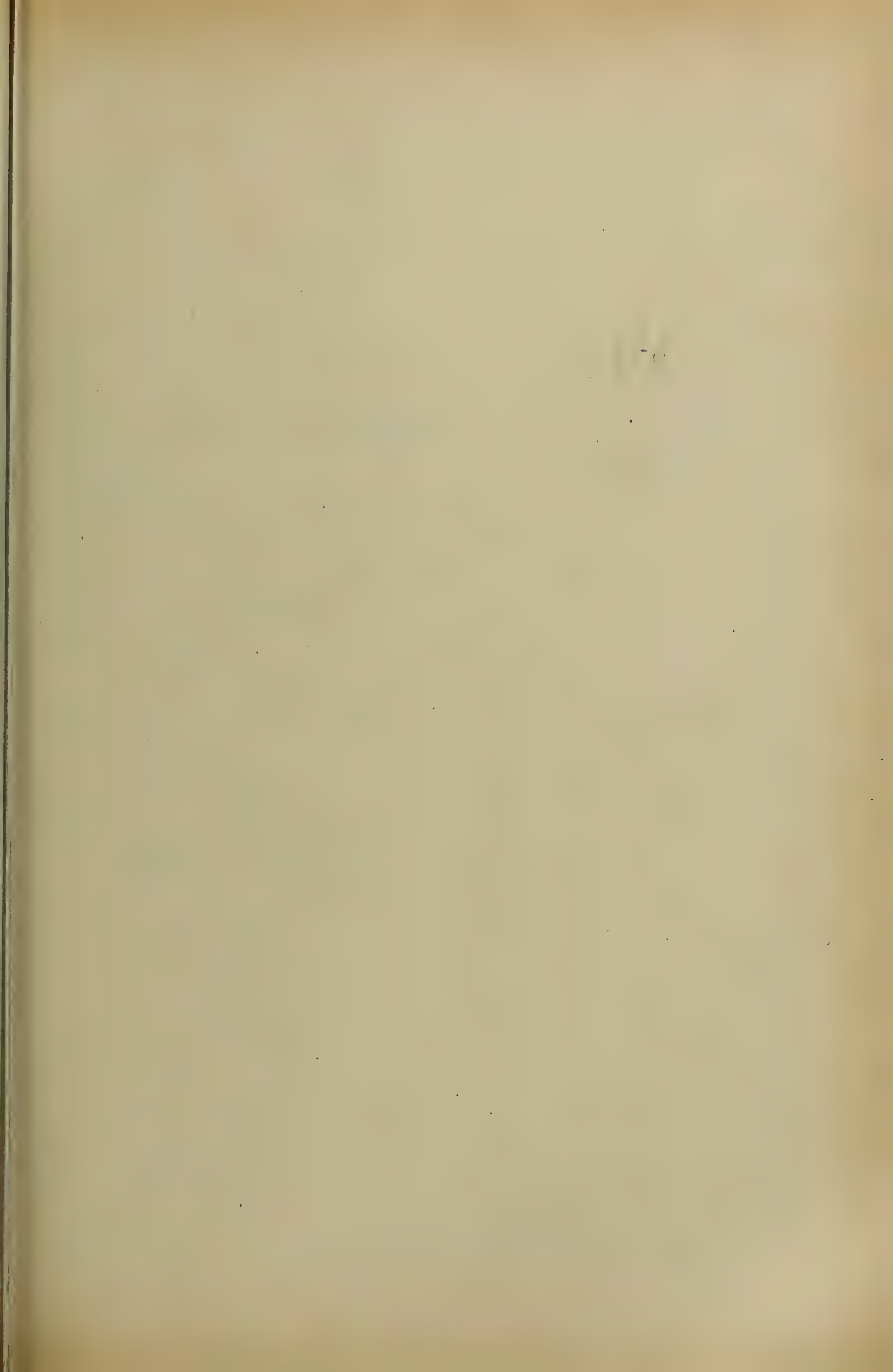
Gustave R. Thompson.
Rich C. Fitzhugh.

By

Thomas H. Macdonald.

Mauro, Cameron, Lewis, Massie.

Attorney.



No. 836,032.

PATENTED NOV. 13, 1906.

J. J. HAMMER.

GRAPHOPHONE.

APPLICATION FILED DEC. 30, 1905.

Fig. 1.

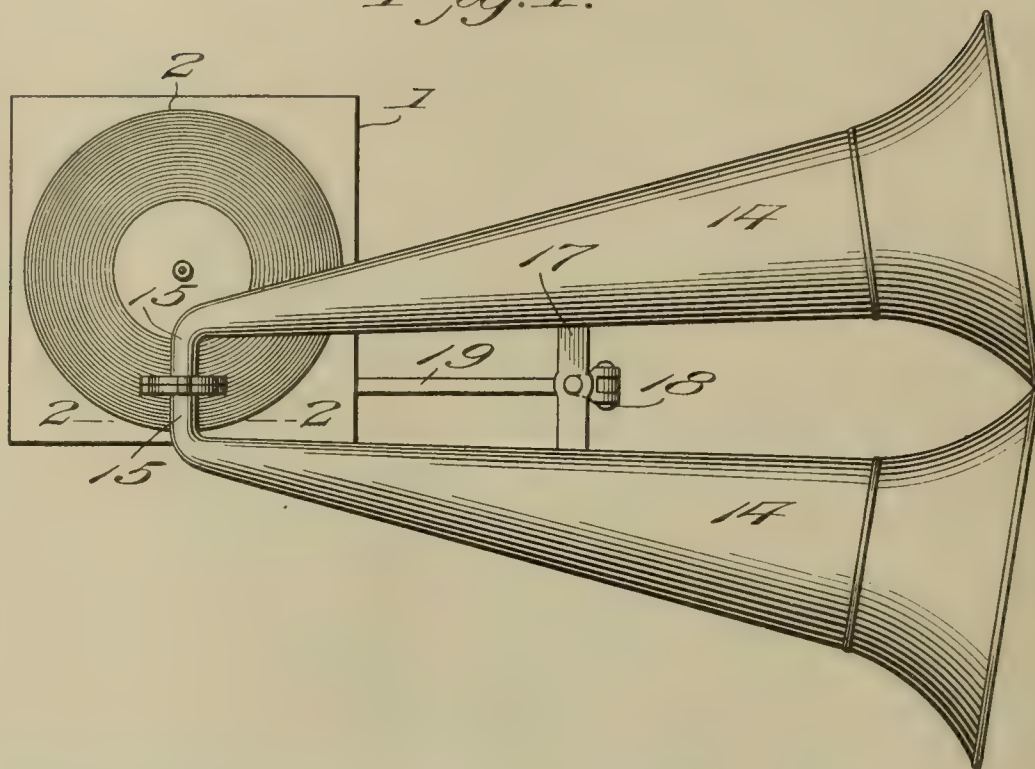


Fig. 2.

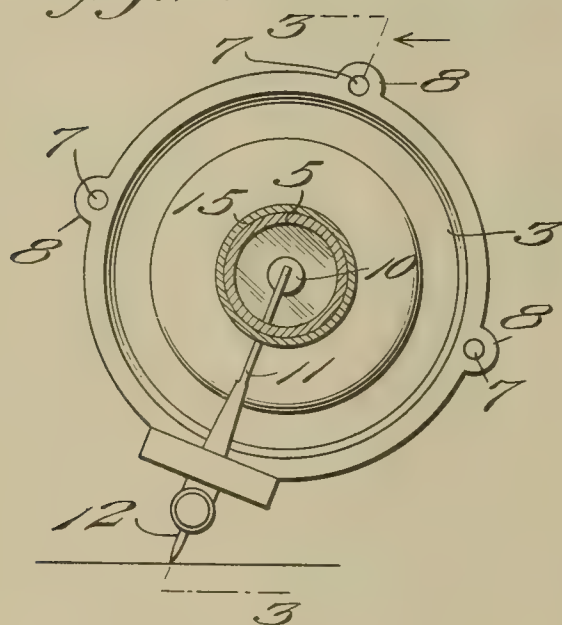
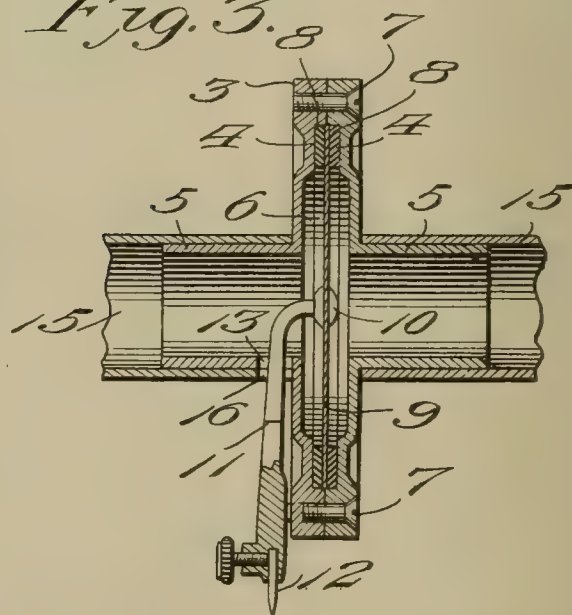


Fig. 3.



Inventor

J. J. Hammer

Witnesses

Edwin L. McKee,
R. M. Smith

By

Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

JUSTIN J. HAMMER, OF RED BLUFF, CALIFORNIA.

GRAPHOPHONE.

No. 836,032.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Application filed December 30, 1905. Serial No. 293,964.

To all whom it may concern:

Be it known that I, JUSTIN J. HAMMER, a citizen of the United States, residing at Red Bluff, in the county of Tehama and State of California, have invented new and useful Improvements in Graphophones, of which the following is a specification.

The invention relates to an improvement in graphophones comprehending specifically a means for intensifying the sound reproduced by the instrument.

The main object of the present invention is the production of a sound-box of a particular construction in the use of which the sound-waves are taken from each side the diaphragm, whereby to intensify the quantity and improve the quality of the sound.

The invention will be described in the following specification, reference being had particularly to the accompanying drawings, in which—

Figure 1 is a plan view showing a graphophone provided with my improved sound-reproducer. Fig. 2 is an enlarged section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 2.

Referring to the drawings, it will be noted that my improved sound-reproducer is designed primarily for use in connection with the graphophone, as 1, of the type using the ordinary disk record, as 2.

The invention specifically comprehends a new and improved sound-box, which is shown in Fig. 3 and consists of duplicate disk-like members 3, circumferentially reduced on their approximate faces to provide recesses 4 and centrally provided with the concentrically-arranged laterally-projecting sleeve 5. The face of each disk between the sleeve 5 and the inner edge of the recess 4 is cut away to provide an enlarged recess 6, said recesses together forming the sound-chamber of the box.

The disks are secured together by screws 7, passed through radially-projecting ears 8, extending from each of the disks and designed to be transversely alined. The recesses 4 of said disks are designed to receive annular strips of suitable deadening material 8, as rubber, between which the diaphragm 9 of the sound-box is clamped in securing the disks together.

The usual head 10 is secured centrally of the diaphragm, from which depends an arm 11, carrying the usual removable stylus 12, the arm projecting to one side of the dia-

phragm and passing through an opening 13 formed in one of the sleeves 5. Duplicate horns 14 are used in connection with the sound-box the smaller end 15 of each of which is preferably of flexible material and of a size to snugly fit the sleeves 5 of the sound-box, that end 15 which fits under the sleeve formed with the perforation 13 being also provided with an opening 16, designed to register with the openings 13 to permit passage of the arm 11. As thus constructed and arranged the sound-waves occasioned by the movement of the diaphragm will be taken from both sides of said diaphragm and delivered simultaneously through the horns 14, thereby materially intensifying the quality of the sound delivered. Furthermore, as the sleeves 5 and sound-chambers 6 on each side of the diaphragm are exactly duplicated in size and construction, there will be no retarding or reflection of the sound-waves on one side of the diaphragm which are not duplicated on the other, whereby the effect of the diaphragm is identical in both sound-chambers, with the result to materially improve the quality of the same.

The duplicate horns 14 are preferably supported on a cross-bar 17, pivotally mounted upon a stud 18, having hinged connection with an arm 19, fixed to the graphophone, whereby to enable the horn to follow the sound-box in its accommodation to the irregularities of the record.

Having thus described the invention, what is claimed as new is—

1. A sound-box comprising duplicate disks formed with centrally-arranged laterally-projecting sleeves, each of said disks being formed with a central recess arranged to provide a sound-chamber, a diaphragm secured between and held by the disks when connected, the sound-chamber of each disk being identical on each side of the diaphragm, a horn arranged for connection with each sleeve, and a stylus-arm secured to the box and projecting through an opening formed in one of the sleeves.

2. A sound-box comprising duplicate disks formed with centrally-arranged laterally-projecting sleeves, each of said disks being circumferentially reduced to provide a recess, and centrally reduced to provide a sound-chamber, the sound-chamber being of greater depth than the recess, said disks being adapted to be secured together to register their respective recesses and sound-chambers, annu-

lar strips of deadening material seated in the
recesses of the respective disks, a diaphragm
secured between said strips, and dividing the
sound-chambers into duplicate sound-cham-
5 bers arranged respectively on opposite sides
of the diaphragm, a sleeve projecting from
each disk in open communication with the
sound-chamber, and a stylus-arm secured to

the diaphragm and projecting through an
opening formed in one of the sleeves. 10

In testimony whereof I affix my signature
in presence of two witnesses.

JUSTIN J. HAMMER.

Witnesses:

SIMON HAMMER,
H. H. HAMMER.

No. 836,089.

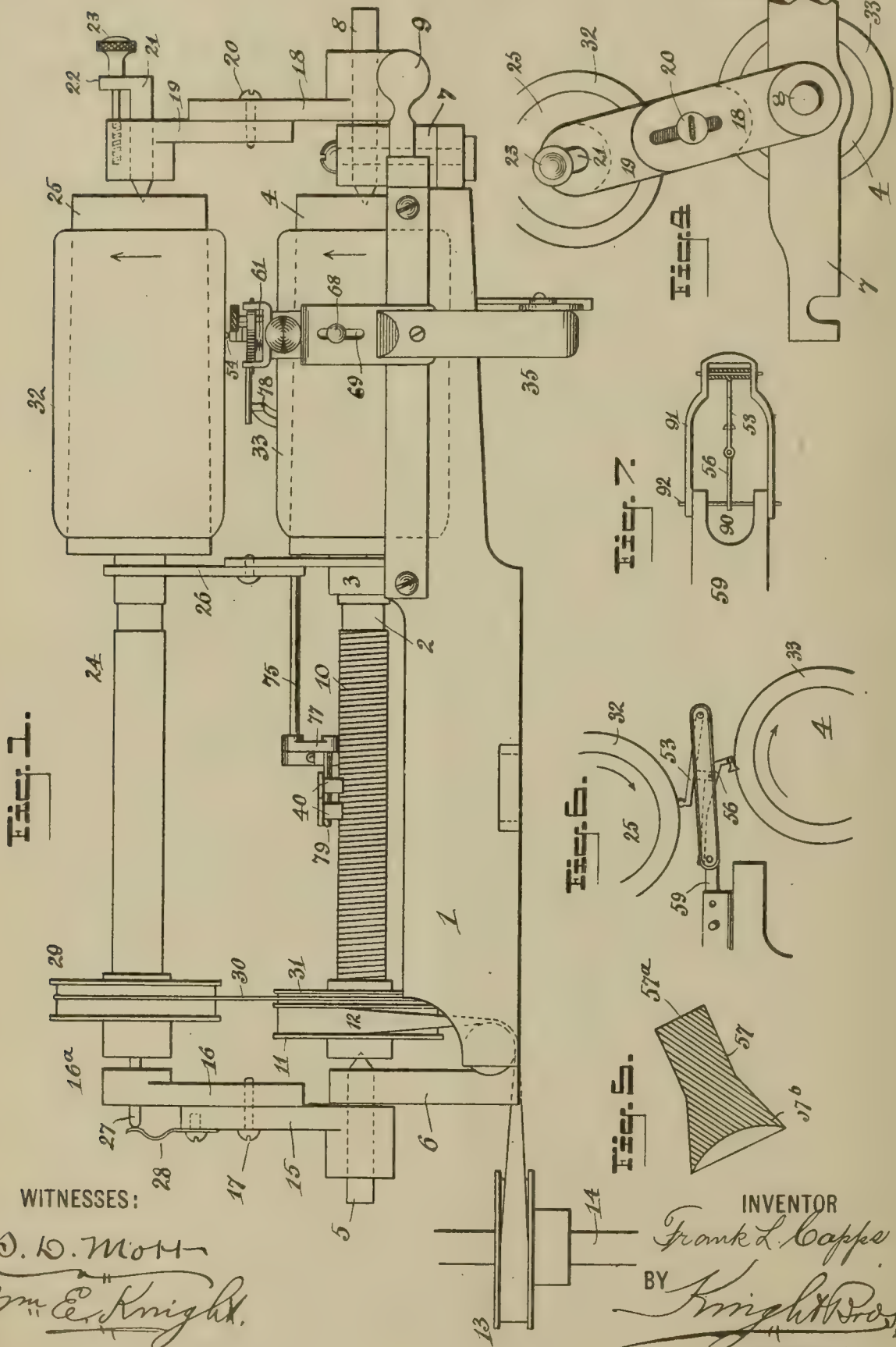
F. L. CAPPS.

PATENTED NOV. 20, 1906.

PHONOGRAPH FOR DUPLICATING PHONOGRAPHIC RECORDS.

APPLICATION FILED SEPT. 9, 1896. RENEWED SEPT. 27, 1897.

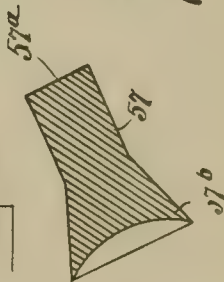
2 SHEETS-SHEET 1.



WITNESSES:

D. D. Mott
Jm E. Knight.

Fig. 5.



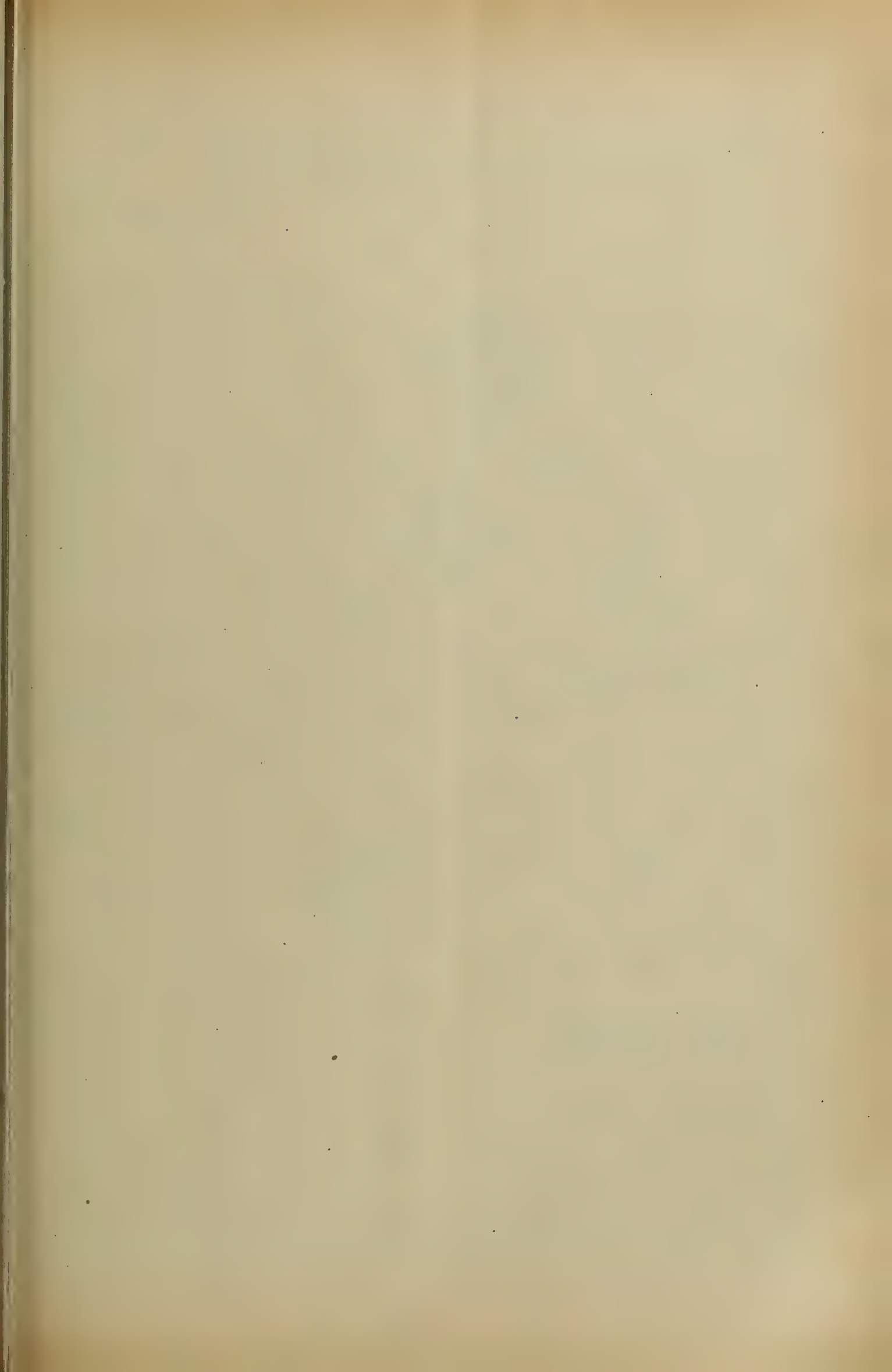
INVENTOR

Frank L. Capps

BY

Knight Bros.

ATTORNEYS



No. 836,089.

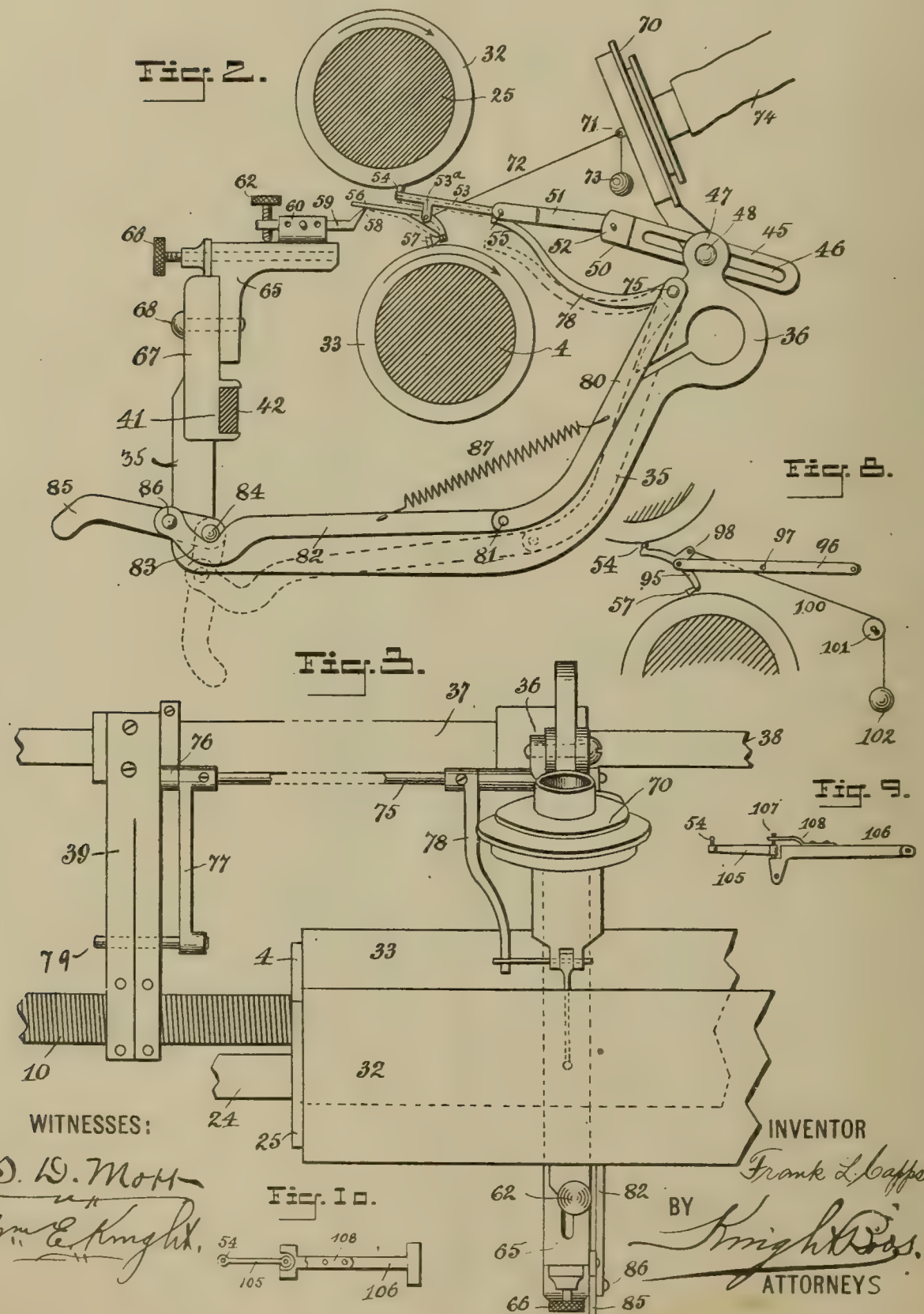
F. L. CAPPS.

PATENTED NOV. 20, 1906.

PHONOGRAPH FOR DUPLICATING PHONOGRAPHIC RECORDS.

APPLICATION FILED SEPT. 9, 1895. RENEWED SEPT. 27, 1897.

2 SHEETS—SHEET 2.



WITNESSES:

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Fig. 10.



INVENTOR

Frank L. Capps

BY

J. E. Knight
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF NEWARK, NEW JERSEY.

PHONOGRAPH FOR DUPLICATING PHONOGRAPHIC RECORDS.

No. 836,089.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed September 9, 1895. Renewed September 27, 1897 Serial No. 653,224.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs for Duplicating Phonographic Records, of which the following is a specification.

My invention relates to improvements in phonograph-machines, and particularly to a machine for duplicating phonographic records.

One of the most important features in my invention is the device for supporting the reproducing and recording styli in operative relation to the cylinders. This device is so arranged and constructed that the recording-stylus will be free to move under the control of the reproducing stylus in a direction approximately perpendicular to the tangent of the record-blank at the point of contact of the recording-stylus therewith and will at the same time be held against movement in the direction of the tangent. This result is accomplished, preferably, by a lever mechanism comprising two levers pivoted together in the line approximately perpendicular to the tangent of the record-blank at the point of contact with it of the recording-stylus, one lever supporting a reproducing-stylus and the other lever a recording-stylus, and independent supports for said levers. The support for one of the levers is preferably an adjustable one, and a weight is also preferably applied to one of the levers to insure uniform operation. This lever device couples the styli together and enables them to automatically adjust themselves to cylinders of different sizes and thicknesses. This arrangement affords a free vibration for the recording-stylus in a direction (perpendicular to the tangent) least affected by the rotation of the blank, and the device is therefore particularly free from choking and is capable of faithfully recording all of the delicate rich tones which render a record full and satisfactory. These finer tones are lost if the recording-stylus is not free to vibrate under the influence of the reproducer.

Another feature of great importance in my invention is the shape and manner of supporting the recording-stylus to produce a clean shearing cut in the record as distinguished from a scraping cut. The stylus is formed with an enlarged frusto-conical cut-

ting-head, and is so supported that the cutting edge will recede from the perpendicular to the tangent at the point of contact with the blank. A stylus of this structure supported in this manner and free to vibrate perpendicularly to the tangent, as above explained, produces a perfect record.

The invention will be understood by reference to the accompanying drawings, wherein—

Figure 1 is a front elevation of my improved record-duplicating phonograph-machine. Fig. 2 is a sectional end elevation of the same. Fig. 3 is a detail plan elevation. Fig. 4 is a detail end view showing the removable centering journal-pins for the two mandrels. Fig. 5 is an enlarged longitudinal sectional view of the recording-stylus. Figs. 6 and 7 are detail views of a modified arrangement for supporting the reproducing and recording styli. Fig. 8 is a detail representation of another modification. Figs. 9 and 10 are detail views representing a portion of the reproducing-stylus arm pivoted to the main portion to allow a slight sidewise movement.

1 is the base of the framework of any suitable construction.

2 is a shaft journaled in the central bearing 3 and carrying at one end one of the mandrels 4.

5 is a centering journal-pin mounted in the standard 6 and engaging with one end of the shaft 2.

7 is a gate or bar hinged to the frame and carrying the centering journal-pin 8, which supports the mandrel end of the shaft 2. The gate 7 is locked in closed position by the hinged finger 9, as in the ordinary construction of a phonograph.

10 is the driving-screw formed on a portion of the shaft 2.

11 is a driving-pulley driven by band 12, which passes over another pulley 13, mounted on the power-shaft 14.

15 and 16 are bracket-arms adjustably secured together by the screw 17. The bracket 15 is mounted upon the centering-pin 5, while the bracket 16 is formed with a journal-head 16^a.

18 and 19 are similar brackets adjustably secured together by the screw 20, the bracket 18 being mounted upon the journal-pin 8. The bracket 19 carries a longitudinally-adjustable journal-pin 21, having right-angled shoulder 22, through which passes an adjust-

ing-screw 23, which engages in the threaded opening in the bracket 19.

24 is the upper mandrel-shaft, and 25 is the mandrel carried thereby.

26 is a central bearing for shaft 24, and 27 is a reduced end of shaft 24, which passes through the journal-head 16^a of bracket 16.

28 is a leaf-spring secured to bracket 15 and bearing on the reduced end 27 to give the shaft 24 a tendency to move longitudinally. The centering-pin 21 engages a journal-recess in the opposite end of shaft 24.

29 is a pulley keyed to shaft 24, and 30 is a band passing around said pulley and around a similar pulley 31, carried by the shaft 2, by means of which the shaft 24 will be driven in the same direction and at the same speed as the shaft 2.

32 and 33 are respectively the record and blank mounted, respectively, on the mandrels 25 and 4. By adjusting the position of the pin 21 it will be observed that the shaft 24, carrying with it the mandrel 25 and record 32, can be adjusted longitudinally to insure the proper engagement of the reproducing-stylus therewith.

35 is a carriage of any suitable construction clamped at 36 to a guide-tube 37, which operates on the customary guide-rod 38.

39 is the customary spring-arm secured to the guide-tube 37 and carrying at its forward end the driving-nuts 40, which are adapted to engage with the rotary driving-screw 10, and thereby push the carriage along.

41 is a suitable guide on the front portion of the carriage which engages the front bar 42 of the ordinary phonograph-machine. The carriage will therefore slide upon the rod 38 and front bar 42.

45 is a supporting-bar formed with a longitudinal slot 46 and secured to the lug 47 of the carriage 35 by means of the clamping-screw 48, which passes through the slot 46. The forward end of the bar 45 is formed with a yoke 50, in which is pivoted a weight 51 on the pins 52.

53 is the reproducing-lever carrying the reproducing sapphire stylus 54 and pivotally connected at its end 55 with the forward end of the pivotally-supported weight 51. The lever 53 has a right-angled extension 53^a, to which is pivotally connected the recording-lever or arm 56, which carries in a suitable socket formed in one end the sapphire recording-stylus 57. The forward end of lever 56 rests on a rounded or sharp edge 58 of the supporting-arm 59, which is pivoted in the sliding block or bracket 60 and is provided with a V or other suitable spring 61 and an adjusting-screw 62 for regulating its position and adjusting the position of the styli. The recording-stylus 57 is preferably formed of a cylindrical link 57^a and an enlarged frusto-conical cutting-head 57^b, which may be hollowed out, as shown in Fig. 5.

The sliding block or bracket 60 is mounted in a suitable slot formed in the bracket 65 and adjusted forward and back in said bracket by the screw 66, which engages a lug on the bracket 60. The bracket 65 is vertically adjusted on the supporting-arm 67 by means of the screw 68 and slot 69.

70 is a telltale-reproducer having a diaphragm of any suitable construction from the center of which projects an eye 71.

72 is a thread attached to the pivot-pin connecting levers 53 and 56 and passing through the eye 71 and provided at its free end with a small weight 73.

74 is a hearing-tube suitably connected to the reproducer 70 and adapted to have suitable earpieces attached, by means of which the vibrations of the reproducing-arm can be heard and the proper operation of the device detected.

75 is a short rock-shaft suitably journaled in bearings 76 in the carriage and carrying the rock-arms 77 and 78. The rock-arm 77 carries a rod 79, which passes under the spring-arm 39 and is adapted to lift the driving-nuts 40 out of engagement with the screw 10 when the rock-shaft 75 is moved.

The rock-arm 78 extends forward and engages under the extension of the pivot-pin 55, which connects the weight 51 and lever 53 and by reason of such engagement disengages the styli from the record and blank. Keyed to the right-hand end of the rock-shaft 75 is an operating-lever 80, pivoted at its lower end 81 to a link 82, which latter has a crooked forward end 83, adapted to extend around a pivot-pin 84.

85 is an operating-finger pivotally mounted upon the pin 84 and connected at 86 with the end of link 82.

87 is a spiral spring attached to lever 80 and link 82 for holding them in the position indicated in full lines in Fig. 2 when all parts are in inoperative position or in the position indicated in dotted lines in said figure when the parts are in operation.

In Figs. 6 and 7 I have shown a slight modification of the device for operatively supporting the styli. In this form of the device the pivoted supporting-arm 59 has a bifurcated forward end 90, to which the weighted lever 91 is pivoted by means of the pin 92. The reproducing-lever 53 is pivoted to the outer end of the lever 90 and is also pivotally connected to the recording-lever 56, as in the preferred form. The forward end of the record-lever 56 rests on the pin 92.

In Fig. 8 I have shown a further modification, in which the reproducing-stylus 54 and recording-stylus 57 are carried in opposite ends of a single lever 95, which is pivotally mounted in the forward end of a balanced weight 96, pivoted upon the pin 97. 98 is a heel projecting from the lever 95, and 100 is a thread extending from said heel over a pul-

ley 101 and provided with a weight 102, which holds the styli to their work in a manner somewhat similar to preferred form.

In Figs. 9 and 10 I have shown the preferred form of reproducing-stylus, in which a forward end of the lever 105, carrying the stylus 54, is pivoted to the rear portion 106 by means of a pin 107, which engages in a suitable socket in the lever portion 106 and a small plate 108. The pivot-pin 107 extends approximately at right angles to the tangent of the cylindrical record at the point which the stylus 54 comes in contact and enables the stylus to readily find its way into the groove of the record.

It will be observed that the stylus-supporting levers 53 and 56 are connected to or supported from suitable stationary points, which prevent movement in the direction of the tangent to the record-blank at the point of contact therewith of the recording-stylus. It will also be observed that the two levers are pivoted together in the line approximately perpendicular to the tangent. In recording or duplicating with my improved machine the tendency of the rotating blank is to move the recording-stylus out of the wax upon an arc drawn from the point of pivot connecting the two levers. Movement in this arc is prevented by reason of the weight and the engagement of the reproducing-stylus with the record which is being copied. The only movement therefore that the stylus can have is in a line perpendicular to the tangent at the point of contact of the stylus with the record, this being the freest and best motion for producing a perfect record, because it is least affected by the movement of the record, and the stylus being constructed and supported to make a clear shearing cut it will be obvious that a perfect reproduction of the original record will be obtained.

It is to be understood that I do not limit myself to the specific forms of mechanisms hereinbefore described, but that various mechanical changes may be made within the scope of the claims without departing from the spirit of the invention.

Having thus fully described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a machine for duplicating phonographic records, the combination of the two levers pivotally connected and carrying respectively a recording-stylus and a reproducing-stylus, and an arm engaging one of said levers and tending to move the recording-stylus forward (in opposition to the direction of travel of the blank) in an arc drawn from the connecting-pivot of the two levers, said arm resisting movement of the recording-stylus in the opposite direction in said arc, and said recording-stylus being free to vibrate in a line perpendicular to the tangent

at the point of contact of the stylus with the blank, substantially as and for the purpose set forth.

2. In a machine for duplicating phonographic records, the combination of the two levers pivoted together and carrying respectively a reproducing-stylus and a recording-stylus, means for supporting the levers in operative position and holding them to their work, a telltale reproducing-diaphragm, an eye attached to said diaphragm, a thread passing loosely through said eye and connected to the pivoted levers, and a weight attached to the free end of said thread, substantially as set forth.

3. In a machine for duplicating phonographic records, the combination of the two levers pivotally attached and carrying respectively a reproducing-stylus and a recording-stylus, a weight engaging the reproducing-lever, a vertically-adjustable bracket, a horizontally-adjustable block or bracket mounted thereon, and an adjustable support pivoted to said horizontally-adjustable block or bracket and engaging and supporting one end of the recording-lever, substantially as set forth.

4. A recording-stylus for phonographs having an enlarged frusto-conical cutting-head, in combination with a cylindrical record-blank and means for supporting the stylus in operative position on the blank with its cutting edge receding from the perpendicular to the tangent at the point of contact, substantially as set forth.

5. In combination with a cylindrical record-blank, a recording-stylus for phonographs having an enlarged frusto-conical cutting-head supported with its cutting edge receding from the perpendicular to the tangent at the point of contact with the blank, and free to vibrate approximately in the line of said perpendicular, substantially as set forth.

6. In a phonograph, the combination of the mandrel, the driving-screw, the carriage, the spring-arm mounted upon the carriage and carrying the driving-nut, the stylus supported from the carriage, a rock-shaft, rock-arms on the rock-shaft adapted to engage the stylus-support and spring-arm, an operating crank-arm also keyed to the rock-shaft, a pivoted finger, a link pivotally connected to the finger and operating crank-arm, and a spring connecting the link and operating crank-arm, substantially as set forth.

7. In a phonograph, the combination of the lower mandrel, the centering-pin journals for said mandrel, brackets supported upon said centering-pins, and means for supporting an upper mandrel upon said brackets, substantially as set forth.

8. In a phonograph, the combination of the lower mandrel, the centering-pin journals for said mandrel, bracket-arms 15 and 18 mounted upon the pin-journals, bracket-

arms 16 and 19 adjustably mounted upon the arms 15 and 18 respectively, and an upper mandrel journaled in the arms 16 and 19, substantially as set forth.

5 9. A cutting-style for sound-records having at one end a thin laterally-projecting circular head having its periphery formed with a cutting edge.

10 10. A cutting-style for sound-records having at one end a thin laterally-projecting head having its periphery sharpened and its face concaved.

11. A cutting-style for sound-records pro-

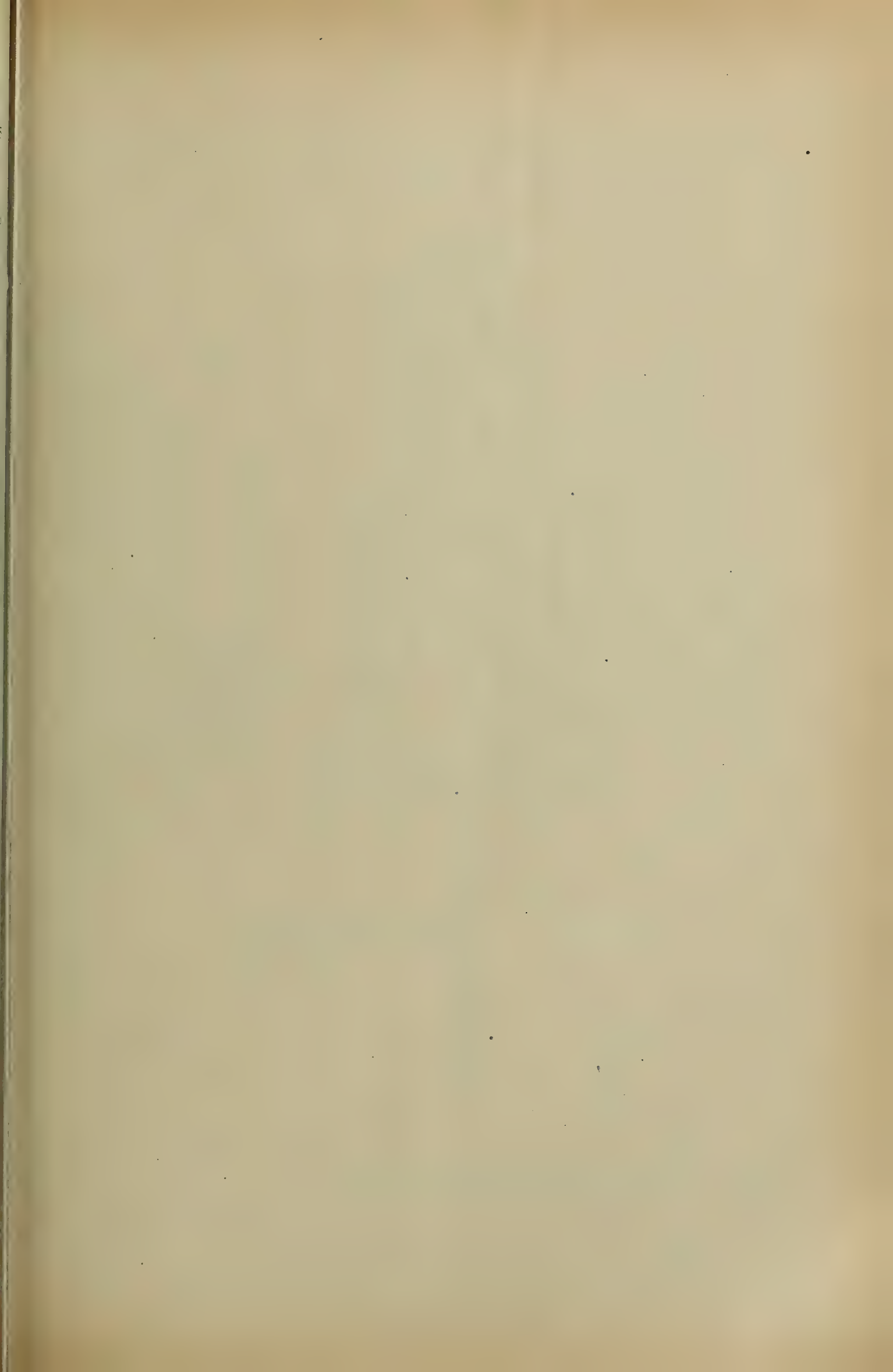
vided at one end with a laterally-extending disk-shaped head having its periphery sharp- 15
ened to form a cutting edge.

12. A cutting-style for sound-records provided at one end with a laterally-extending disk-shaped head having its periphery sharpened to form a cutting edge and having its 20
face concaved.

FRANK L. CAPPS.

Witnesses:

WM. E. KNIGHT,
J. GREEN.



No. 836,417.

PATENTED NOV. 20, 1906.

W. S. TYLER.
APPARATUS FOR MOLDING SOUND RECORDS.
APPLICATION FILED NOV. 4, 1905.

FIG. 1.

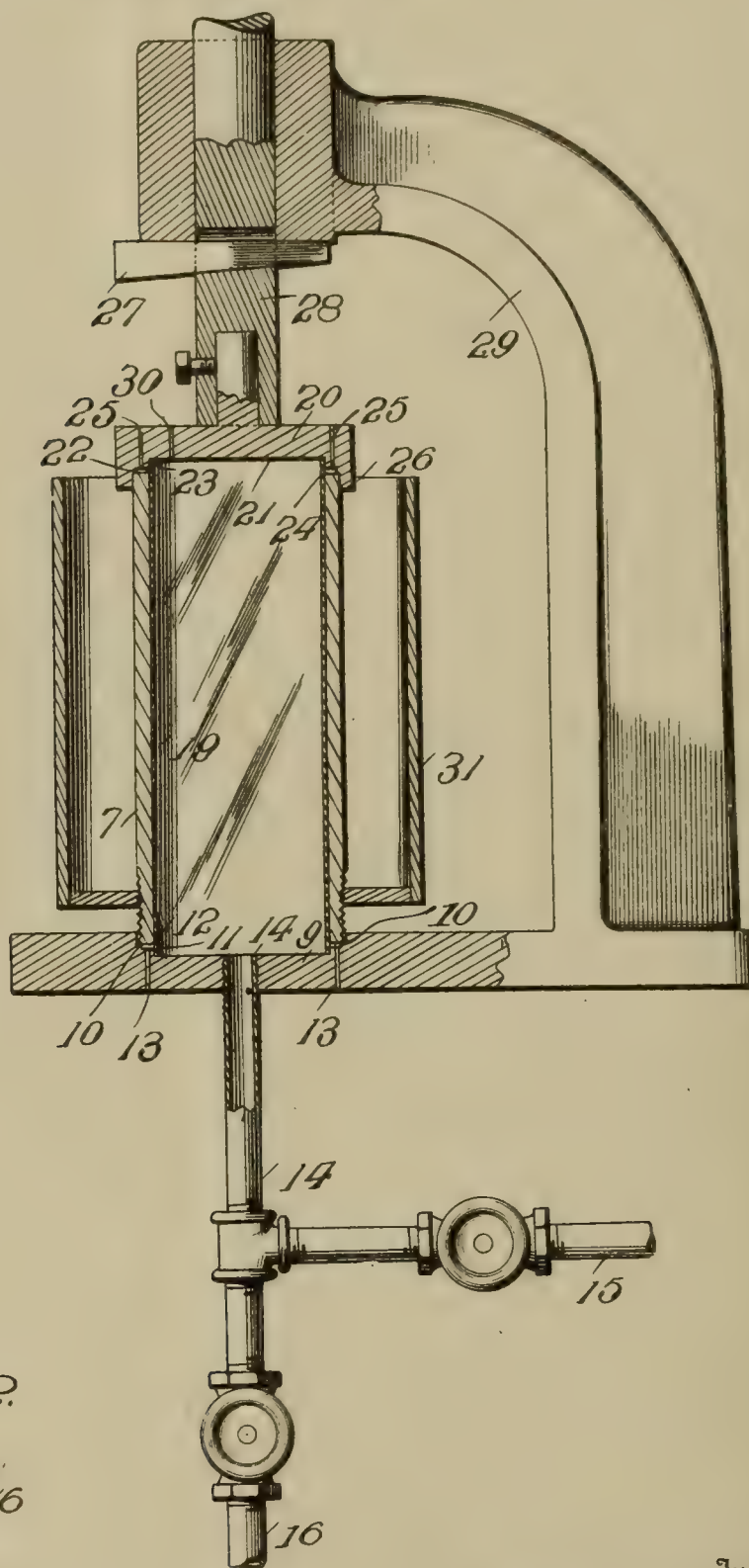
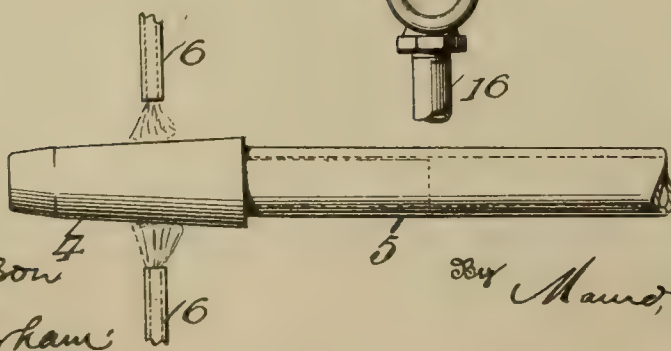


FIG. 2.



Witnesses

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Inventor

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UNITED STATES PATENT OFFICE.

WALTER S. TYLER, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CON-
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APPARATUS FOR MOLDING SOUND-RECORDS.

No. 836,417.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed November 4, 1905. Serial No. 285,832.

To all whom it may concern:

Be it known that I, WALTER S. TYLER, of Bridgeport, Connecticut, have invented a new and useful Improvement in Apparatus for Molding Sound-Records, which invention is fully set forth in the following specification.

My invention relates to improvements in apparatus for producing duplicate cylindrical sound-records by impressing blank cylinders against the inner surface of a matrix, and particularly blank cylinders having a thin wall and made of materials such as celluloid, my object being generally to improve the efficiency of such apparatus in forming upon the record-blank an accurate impression of the surface of the matrix.

The improvements constituting the invention may be readily comprehended from the detailed description and drawings. The latter show the preferred embodiment.

Figure 1 is a vertical sectional view of the apparatus, and Fig. 2 is a schematic view of means adapted to be used in preparing blank record-cylinders for use in the apparatus of Fig. 1.

The construction of the apparatus will be described in explaining its manner of use in forming duplicate cylindrical sound-records.

The raw material from which the blanks are formed is preferably in the form of celluloid tubes. These tubes are forced over a tapered cylindrical mandrel 4, preferably of solid metal, having a shank or stem of smaller diameter adapted to fit into one end of a section of pipe 5, the other end of the latter being supported in any suitable manner, as in the jaws of a vise. Pipe 5 must be of such length as to accommodate the entire length of the celluloid tube. By this operation irregularities in the size and cylindrical form of the tubes will be removed by releasing pipe 5 from the vise and the pipe then replaced in the vise with mandrel 4 between nozzles 6 6, from which jets of steam are projected to heat the mandrel. After a tube is thus shaped and stretched, which operation is facilitated by heating of the mandrel, it is cut up into suitable lengths, which are washed, dried, and coated with a solution of dye of the proper color dissolved in acetone or similar liquid, which is a solvent of celluloid. These blanks after becoming perfectly dry are ready to receive an impression. A blank

19 thus formed, and preferably previously coated with a very thin film of oil to prevent sticking in the mold, is placed in the matrix or mold 7, Fig. 1, the latter bearing on its inner surface a ridge the counterpart of the sound-record groove to be impressed in the blank. The matrix is supported upon and its lower end closed by a base-plate 8, having therein a circular recess 9, which at its greatest diameter is large enough to receive the lower extremity of the matrix. The peripheral edge of this recess is formed with two annular shoulders, an outer shoulder 10, upon which the matrix rests, and an inner shoulder 11, between which and the lower edge of the matrix there is left an annular space 12, the latter having vents or outlets 13 extending through the base-plate. Within the shoulder 11 and bounded by the vertical wall of said shoulder the recess 9 is of a diameter approximately equal to the internal diameter of the matrix. A pipe 14, tapped through the base-plate 8, communicates with a valve-controlled steam-pipe 15 and a valve-controlled compressed-air pipe 16.

The upper end of the matrix is closed by a plate or cap 20, having an arrangement of recess and shoulders similar to that of the base-plate. 21 is a circular recess in the under side of said cap, having two peripheral annular shoulders, an outer one, 22, which bears against and supports the cap upon the upper extremity of the matrix, and an inner one, 23, between which and the end of the matrix there is left an annular space 24, having vents or outlets 25 extending through the top plate or cap. A depending flange 26 around the edge of the cap fits closely around the end of the matrix.

A blank 19, which should be of a length slightly greater than the length of the matrix plus that portion of the depths of recesses 21 and 14 which is beyond the ends of the matrix, having, as before stated, been placed in the matrix, the latter seated in the base-plate, and the cap adjusted to position above the matrix, it will be found that the blank by reason of its length will hold the shoulder 22 slightly above the end of the matrix. Downward pressure is applied to the cap by means of a wedge 27 engaging an opening through stem 28 (to which latter the cap is secured) and acting against a fixed rigid

overhanging arm 29. This pressure forces and compacts the ends of the blank tightly against the bottom walls of the recesses 9 and 21, forming tight joints at these points, and finally seats shoulder 22 against the end of matrix 7. Steam at suitable pressure is now admitted through pipes 15 and 14 to soften and expand the celluloid blank. Any escape of steam that may take place around the ends of the blank and out through the annular spaces 12 and 24 is quickly checked by the suction caused by the escaping steam drawing the softened celluloid into the crevices through which the steam is escaping, thereby sealing said crevices against further escape of steam. In this manner the celluloid may be caused to slightly protrude into the spaces 12 and 24. After the steam has sufficiently softened the celluloid and expanded the blank to take an accurate impression of the surface of the matrix the steam is turned off by closing the valve in pipe 15. Air under desired pressure is now admitted through pipes 16 and 14, by opening the valve in the former, to maintain sufficient internal pressure to hold the celluloid record-cylinder in engagement with the surface of the matrix while said record-cylinder is cooling and hardening. A small opening 30 through cap-plate 20 permits the constant escape of a very limited quantity of steam and later of compressed air. While this escape of fluid is not sufficiently rapid to cause a material or detrimental fall of pressure, it does effect a circulation of the fluids through the matrix, which facilitates the maintenance, in the case of steam, of the desired heating temperature, and, in the case of compressed air, of a better cooling temperature. The cooling may be hastened by filling or circulating through the jacket 31 (screw-threaded onto the matrix 7) cold water or other cooling liquid. After the record has sufficiently cooled and hardened to retain its shape, the internal pressure of the compressed air having been maintained during the hardening, the supply of compressed air is turned off by closing the valve in pipe 16, the cap 20 is raised, and the record removed. The record will have contracted sufficiently to disengage it from the surface of the matrix, so that it may be readily removed by longitudinal movement. The removal may be facilitated by giving the interior surface of the matrix a slight taper.

In the above-described operation of forming the sound-record all air trapped between the surface of the matrix and the outer surface of the blank cylinder will by the expansion of the blank into tight engagement with the matrix-surface be forced to the ends of the matrix, where it will escape through the annular spaces 12 and 24 and vents 13 and 25.

As will be observed, the duplicate cylindrical sound-record made in my apparatus does not have at its ends the customary inturned flanges for fitting the mandrel of a talking-machine. The formation of such flanges in the usual way on records of this type adds greatly to their expense, due to the additional steps of turning in the ends of cylinders and then reaming the inner edges of these flanges to form openings of the proper size to fit the machine-mandrel. Furthermore, to prevent wobbling of the sound-record and consequent interference with the operation of the reproducing mechanism the openings formed by the flanges must be accurately concentric to the surface of the record-cylinder. In reproducing on ordinary machines from my records, which are greatly cheapened by omission of the flanges mentioned, I propose to employ an auxiliary mandrel or support closely but removably fitting within the sound-record and having a longitudinal central opening removably fitting the machine-mandrel. The sound-record bears throughout against a solid cylindrical surface of the auxiliary mandrel, and any irregularities in the record-cylinder, due, for example, to aging or warping, will be rectified by the accurate surface of the auxiliary mandrel. The reproductions from records of this type thus backed will be louder and the tone better than reproductions from similar records having end flanges, and thus touching the mandrel only at the ends.

What I claim as new is—

1. In apparatus for molding sound-records by impressing a cylindrical blank against the inner surface of a cylindrical matrix, the combination of a cylindrical matrix, a plate for closing the matrix at one end having therein a recess into which one end of the blank is adapted to closely fit and extend beyond the end of the matrix, the junction between the plate and matrix forming an annular vented space adapted to surround the cylindrical blank a short distance from its said end and communicate with the space between the outer surface of the blank and inner surface of the matrix in the operation of forming a duplicate record.

2. In apparatus for molding sound-records by impressing a cylindrical blank against the inner surface of a cylindrical matrix, the combination of a cylindrical matrix, a plate for closing the matrix at one end having therein a cylindrical recess having approximately the internal diameter of the matrix into which recess one end of the blank is adapted to closely fit and extend beyond the end of the matrix, the junction between the plate and matrix forming an annular vented space adapted to surround the cylindrical blank a short distance from its said end and communicate with the space between the

outer surface of the blank and inner surface of the matrix in the operation of forming a duplicate record.

3. In apparatus of the class described, the
5 combination of a cylindrical matrix, a base-plate for closing the lower end and a cap for closing the upper end of the matrix, both said plate and cap having therein a recess into which the ends of the cylindrical blank
10 are adapted to closely fit and extend beyond the ends of the matrix, the junctions between the base-plate and matrix and cap and matrix forming annular vented spaces adapted to surround the cylindrical blank at short
15 distances from its opposite ends respectively and each communicate with the space between the outer surface of the blank and the inner surface of the matrix in the operation of forming a duplicate record.

20 4. In apparatus of the class described, the combination of a cylindrical matrix, a base-plate for closing the lower end and a cap for closing the upper end of the matrix, both said plate and cap having therein a recess
25 having approximately the internal diameter of the matrix into which recess the ends of the cylindrical blank are adapted to closely fit and extend beyond the ends of the matrix, the junctions between the base-plate
30 and matrix and the cap and matrix forming annular vented spaces adapted to surround the cylindrical blank at short distances from its opposite ends respectively and each communicate with the space between the outer
35 surface of the blank and the inner surface of the matrix in the operation of forming a duplicate record.

5. In apparatus of the class described, the combination with a cylindrical matrix, of a
40 plate for closing one end of the matrix having a recess therein into which one end of the cylindrical blank is adapted to closely fit and extend beyond the end of the matrix, a shoulder on one part bearing against the other
45 part forming between the adjacent surfaces of the plate and matrix an annular space adapted to surround the blank near its said end, said space having outlets or vents.

6. In apparatus of the class described, the

combination with a cylindrical matrix, of a 50 base-plate for closing one end and a cap for closing the other end of the matrix, an annular flange on the cap depending about the upper end of the matrix, said base-plate and cap each having therein a recess into which 55 the respective ends of the cylindrical blank are adapted to closely fit and extend beyond the ends of the matrix, and bearing-shoulders holding the parts apart to form between adjacent surfaces of the matrix and cap and 60 the matrix and base-plate annular spaces adapted to surround the blank near its ends respectively, said spaces having vents.

7. In apparatus of the character described, the combination with a cylindrical matrix 65 and end plates for closing the ends thereof, of a small constantly open outlet or vent-opening of fixed or invariable size communicating with the chamber of the matrix within a record-cylinder therein, whereby the uninter- 70 rupted and regular escape through said vent of pressure-exerting fluid introduced into the matrix in the operation of making an impressed sound-record effects a regular circulation of said fluid through the matrix. 75

8. In apparatus of the class described, the combination with a cylindrical matrix or mold, of means for closing the ends thereof, means for admitting a heating fluid and a cooling fluid to the interior of the matrix, and 80 independent means for applying a cooling liquid to the exterior of the matrix.

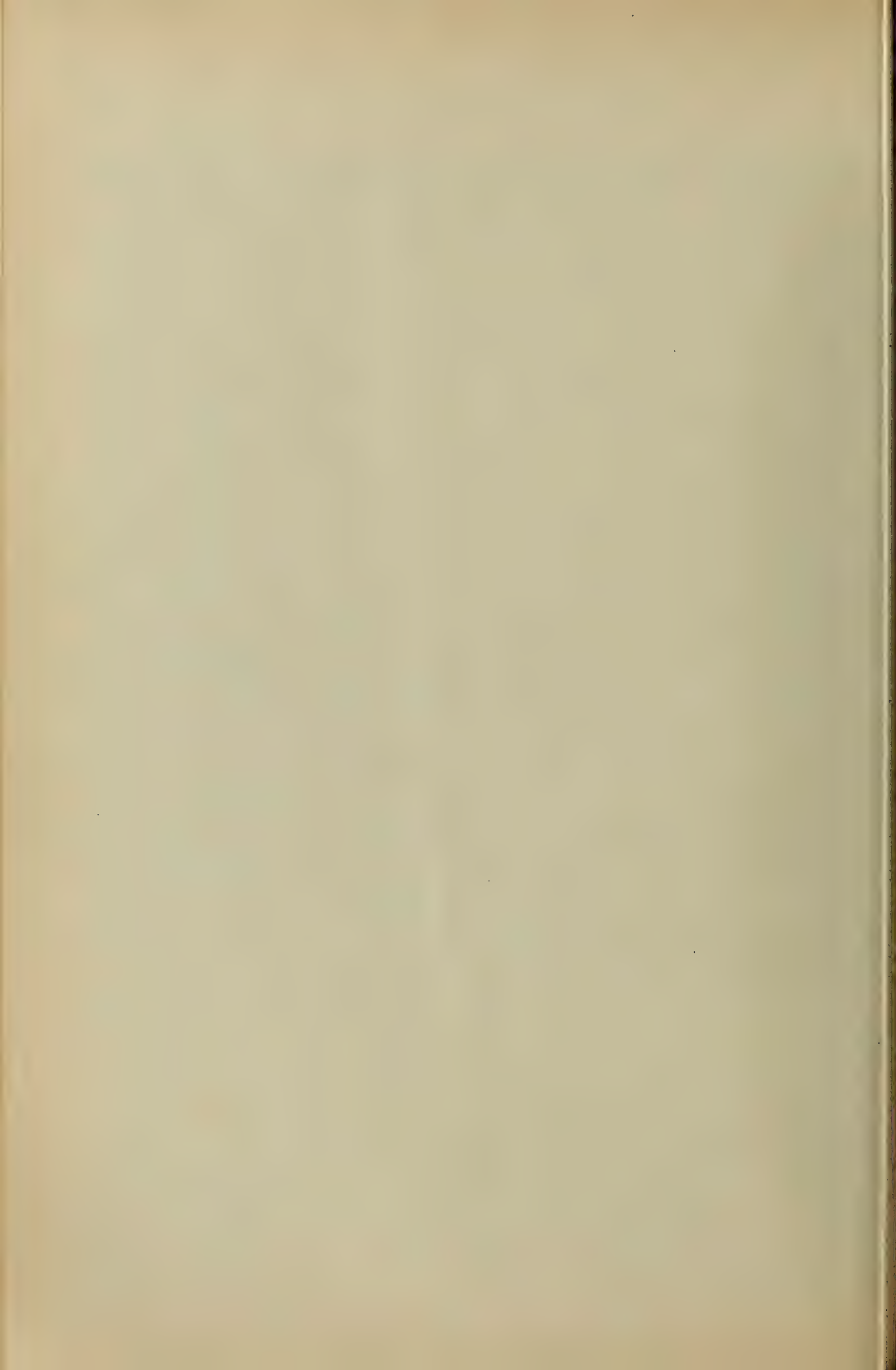
9. In apparatus of the class described, the combination with a cylindrical matrix or mold, of means for closing the ends thereof, 85 means for admitting a heating fluid and a cooling fluid to the interior of the matrix, and a jacket about the matrix adapted to receive a liquid independent of the admission of cooling fluid to the interior of the matrix. 90

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER S. TYLER.

Witnesses:

F. H. OSBORNE,
F. W. ROCK.



E. C. SMITH.
PHONOGRAPH.

APPLICATION FILED APR. 26, 1906.

2 SHEETS—SHEET 1

Fig. 1

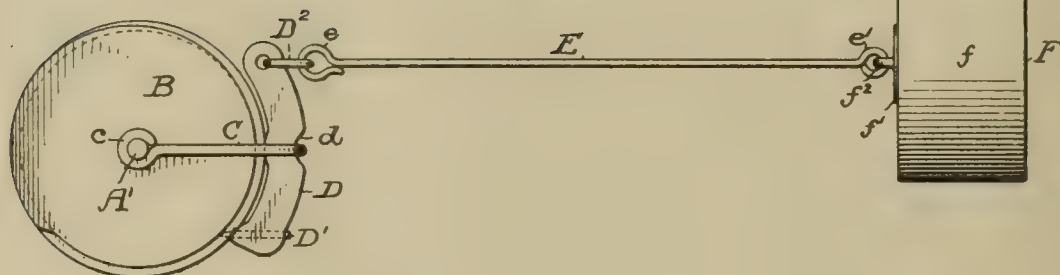


Fig. 2

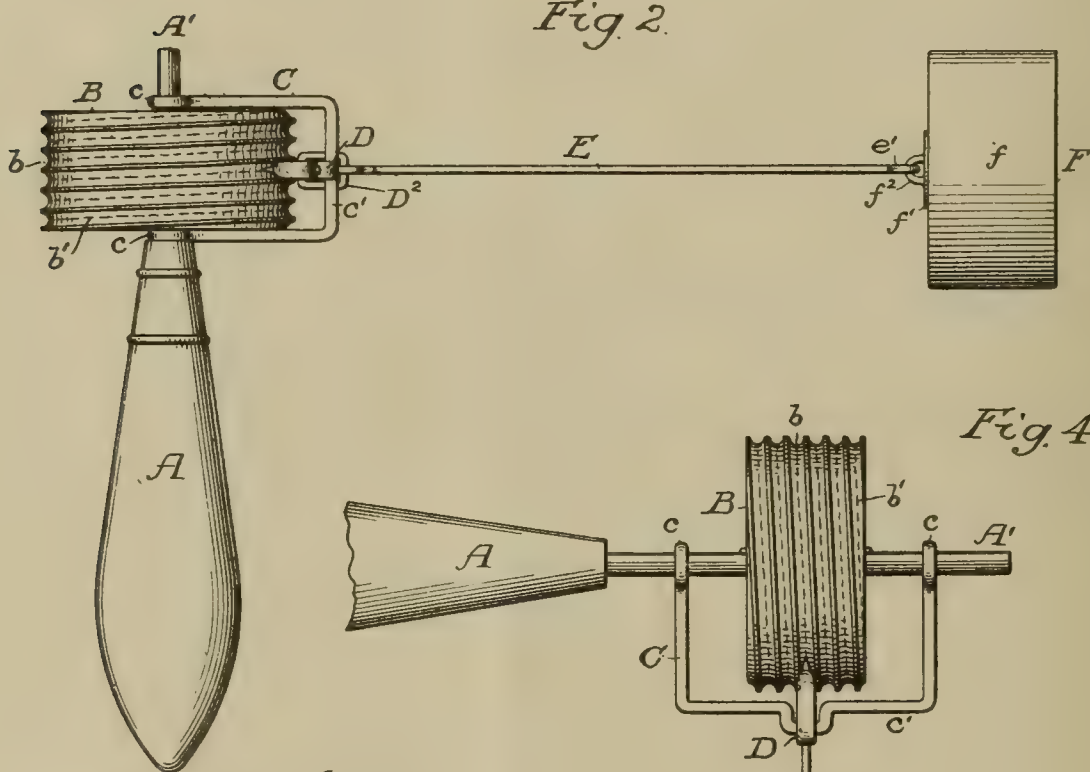


Fig. 4

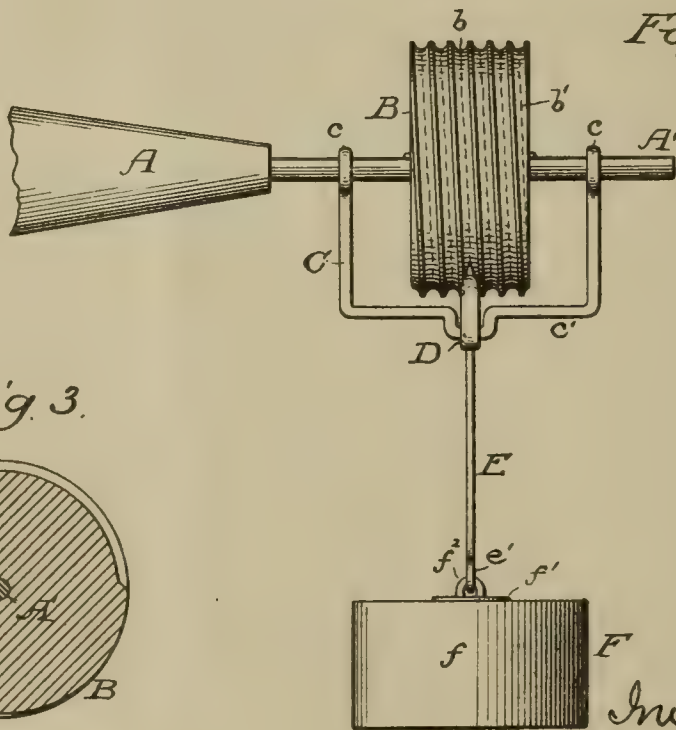
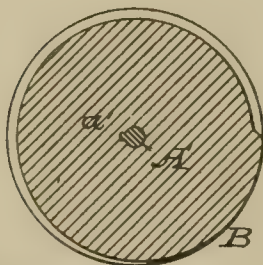
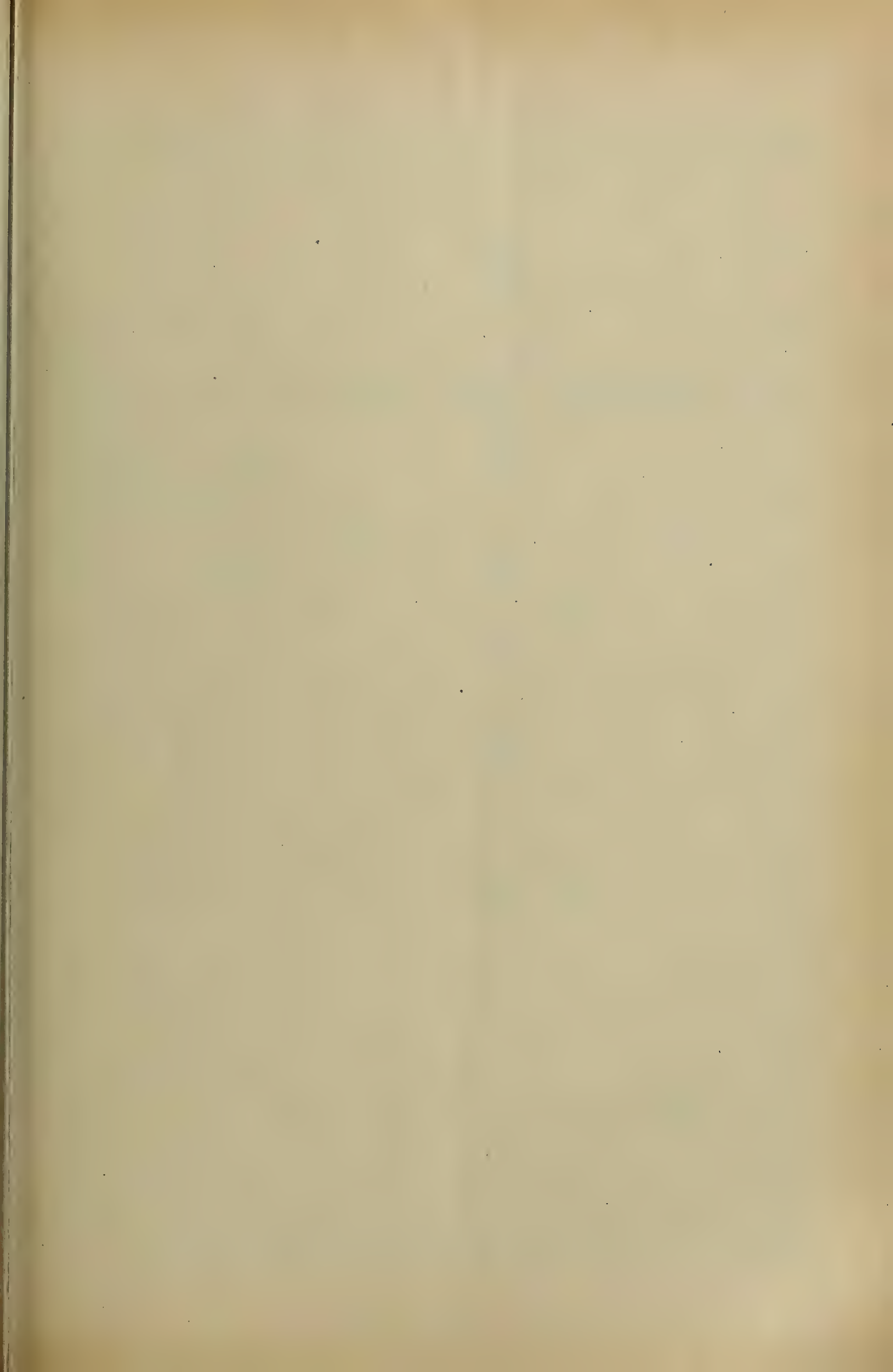


Fig. 3



Witnesses
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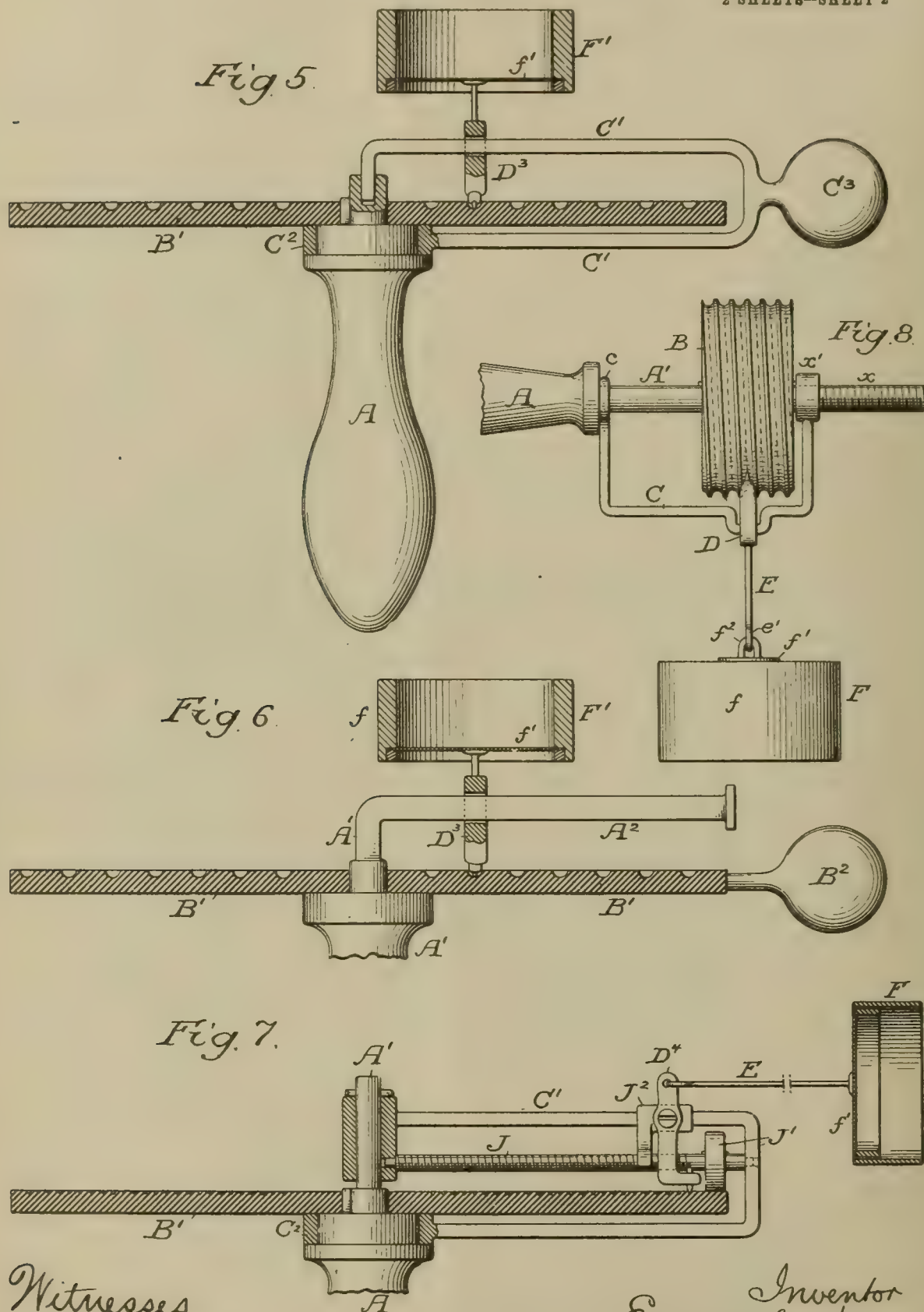
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APPLICATION FILED APR. 26, 1906.

2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE.

EUGENE C. SMITH, OF NEW YORK, N. Y., ASSIGNOR TO HAWTHORNE AND SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PHONOGRAPH.

No. 836,470.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed April 26, 1906. Serial No. 313,863.

To all whom it may concern:

Be it known that I, EUGENE C. SMITH, a citizen of the United States, residing in the borough of Manhattan, city of New York, county and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a top view of the toy. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse section of the phonographic cylinder and feathered spindle on which it is carried; and Figs. 4 to 8, inclusive, are views, partly in side elevation and partly in section, illustrating other embodiments of my invention.

My invention relates to phonographic devices, and more particularly to a device to be carried in the hand which when whirled about will reproduce in sounds the phonograms impressed upon a phonographic "record."

The object of the invention is to provide such a device of simple and cheap construction, easily manufactured, portable, and adapted to answer the purposes of a toy; and the invention consists, broadly, in the use, with a handle, of a phonographic record and a "transmitter" connected to a stylus arm or lever, the transmitter or record having rotary motion, whereby the stylus is caused to pass over the phonogram and the transmitter is actuated.

Preferably my invention consists in mounting the record non-rotatively on the handle and yoking the transmitter freely to the handle, so that on whirling the device about the transmitter will have a movement of rotation concentrically about the axis of the record.

In that form of my invention embodied in Figs. 1, 2, and 3 of the drawings, A designates the handle of the device, which may be made of any suitable form, and A' a spindle fixed thereon and projecting to any desired distance.

B is a phonographic record, in this instance shown as of the ordinary cylindrical form. The record is held fast on the spindle A' by means of the feather a' or in any other well-known way. The spindle projects both above and below the record to afford a bearing for a yoke or clevis C. This is made of wire or other suitable material and has the

eyes c at its ends, the eyes loosely surrounding the spindle A'.

D is a rocking arm or stylus-lever supported by the bar c' of the clevis between the clevis and the face of the record. The manner of this support is non-essential; but it must be such that the lever has a pivoted or rocking bearing on the clevis and to be free to move parallel to the face of the record. As shown, this is accomplished by recessing the lever, as at d, so that the clevis-bar c' may fit in said recess, the lever being then free to rock slightly on said clevis and to move on a line parallel to the record-face. The stylus-lever is of a width at the recess d sufficient to nearly fill the space between the clevis and the face of the record. By this means the lever is prevented from falling out of position.

D' is the reproducing-stylus, which may be of any material or shape desired. I have shown it as a pin inserted through the end of the lever. At the other end of the lever is a ring D², and to said ring is attached by any suitable connection E the transmitter F, which, as shown, is the ordinary transmitter used for toy telephones and comprising a cylinder f, of wood, metal, or other suitable material, having a tightly-stretched diaphragm at one end.

The connection E may be a direct connection comprised of cord, catgut, wire, or other suitable material. I have illustrated it, however, as made of a wire or rod having a hook e at one end for engagement with the ring D² and a hook or loop e' at its outer end, which hooks over a ring f², fast to the center of diaphragm f'.

In order that the stylus may "track" properly and that the lever D may be moved parallel to the face of the record as the transmitter is rotated, I provide the record B with a spiral thread or groove b, in the bottom of which the line of phonogram b' is impressed or incised. The depth of this groove b when the device is being used prevents the stylus from escaping from the phonogram-track, and as the groove is spiral it moves the stylus-lever D positively across the face of the record as the transmitter is revolved. This groove may be of any suitable cross-section; but I have shown it as concave. In practice the stylus-pin D' would be so adjusted that

that end of the lever would bear slightly in said groove. It will be seen that by pushing in the free end of the lever D the stylus will be raised out of groove *b* and the lever be free to be adjusted to any position along the cross-bar *c'* of the clevis.

In operation the stylus-lever is placed at its lowermost position on the clevis, assuming that the phonograms start from that end of the spiral groove. The device is then grasped by the handle and the transmitter F whirled about the spindle A' and record B as a center. The centrifugal force of such whirling motion pulls on the connection E, and that pulling on the free end of lever D forces the stylus against the phonogram of the record, while the rotary motion of the transmitter draws the stylus along and over the phonogram, the vibrations of which are transmitted to the lever D, the connection E, and the diaphragm of the transmitter F, whereby the vibrations are translated into sound-vibrations in the manner understood by those conversant with the phonographic art.

I intend my device as a toy or for the purpose of reproducing certain popular cries, calls, or campaign-phrases and to be operated after the manner of the well-known "buzzers" or watchmen's rattles.

While I have shown in Figs. 1, 2, and 3 a convenient form of my invention, I do not wish to be limited thereto or to any particular form of record, clevis, stylus-lever, connection, or transmitter or to the relative arrangement of these shown, as all of these elements may be modified without departing from the spirit of my invention.

As instances of some other embodiments of my invention I may refer to Figs. 4 to 7.

In the device shown in Fig. 4 the stylus-lever D is mounted upon the yoke C, so that it can have no longitudinal movement thereon, and the yoke can have no longitudinal movement on the spindle A'. Hence as it is carried around the record the engagement of the end of the lever with the spiral groove *b* of the record will cause the latter to travel longitudinally along said spindle A', upon which it is mounted to have no rotary movement.

Figs. 5, 6, and 7 illustrate some of the applications of my invention to devices for using "disk" records B' in place of the "cylinder" record B.

In the device shown in Fig. 5 the disk record B' is secured against rotation upon the top of the handle A, and the yoke C' has one end axially journaled in the end of the handle and the other end secured to a ring C², free to turn on the handle, a weight C³ being secured to the outer portion of the yoke to facilitate the rotation of the same and steady its movement. The stylus is carried by a bar D³, which is longitudinally guided on the yoke, but has a certain amount of freedom in

a direction transverse to the yoke. This bar is connected to the diaphragm *f'*, which is preferably mounted in a transmitter F', having such inertia that the vibrations of the diaphragm will not materially affect it. The wave-like contour of the phonogram-groove of the record will therefore cause movement of the bar D³ in a direction transverse to the yoke and consequent vibration of the diaphragm.

Fig. 6 illustrates the application of the same idea to a device in which the disk record B' rotates, the same being furnished with a weight B² for the same purpose as the weight C³ employed in connection with the yoke in the device last described.

The spindle A' is bent at a right angle to form a guide A² for the bar D³.

In Fig. 7 I have shown a device in which a positive movement derived from a feed-screw is imparted to the stylus-lever to cause the stylus to follow the groove of the record.

The rotatable yoke C' has a hub turning on the spindle A' and carrying one of the journals of a screw-stem J, whose other journal is in the outer member of the yoke. This screw-stem has a wheel or disk J', which as the yoke C' is rotated is driven by frictional contact with the face of the record and rotates the screw-stem.

A slide J², guided on the yoke C', has a projection engaging the screw-stem, and hence is caused to move longitudinally on the yoke, and to this slide is pivoted the stylus-lever D⁴, which has connection E with the diaphragm *f'* of the transmitter F.

The pitch of the screw-stem J bears such relation to the pitch of the spiral groove of the record that the stylus is caused to properly follow the latter.

The feed-screw idea may also be adopted in devices of the character shown in Fig. 4. For instance, the axial pin or spindle A' may be threaded, as at *x'* in Fig. 8, for engagement with a nut *x'* on the yoke or clevis C, so as to cause the same to travel longitudinally along the spindle as it is rotated about the same, any ordinary form of slip-nut or its equivalent being employed, if desired, in order to permit a quick return of the yoke to its starting position.

I claim—

1. Phonographic device having, in combination, a handle, a phonographic record, a stylus and a transmitter, the record and the transmitter adapted to rotate one relatively to the other and being so arranged that a whirling motion given to the handle will draw the said stylus over and against the phonograms of the record, substantially as described.

2. A phonographic device having, in combination, a handle, a record mounted on said handle, a stylus and a transmitter, the record and transmitter adapted to rotate one relatively to the other and being so arranged that

a whirling motion given to the handle will cause said rotation and draw the stylus over and against the phonograms of the record.

3. A phonographic device having, in combination, a handle, a record fixedly mounted on said handle, and a stylus and transmitter connected to said handle to rotate about said record when the handle is given a whirling motion, substantially as described.

4. A phonographic device having, in combination, a handle, a phonographic record and stylus mounted to rotate one in respect to the other, a transmitter having a diaphragm and a connection between said diaphragm and stylus, substantially as described.

5. A phonographic device having, in combination, a handle, a phonographic record fixedly mounted thereon and having a spiral line of phonograms on its face, a stylus mounted to have a movement of rotation about the record and a movement parallel to the record-face, means for guiding the stylus in contact with the spiral line of phonograms, a transmitter having a diaphragm, and a connection between said diaphragm and the stylus, substantially as described.

6. A phonographic device having, in combination, a handle, a phonographic record fixedly mounted thereon, a yoke or clevis mounted on the handle and free to turn about the said record, a rocking lever mounted on said yoke, a stylus on one end of said lever adapted to bear against the phonograms of the record, a transmitter free to be rotated about the record and having a diaphragm, and a connection between said diaphragm and the free end of said lever, substantially as described.

7. A phonographic device having, in combination, a handle, a phonographic record fixedly mounted thereon, a yoke or clevis mounted on the handle and free to turn about said record, a stylus mounted on said yoke to move over the face of the record as said yoke rotates, a transmitter free to be rotated about the record, and a connection between said transmitter and said stylus, substantially as described.

8. A phonographic device having, in combination, a handle, a phonographic record fixedly mounted thereon, a yoke or clevis mounted on the handle and free to turn about said record, a rocking lever mounted on said yoke to move across the face of the record, a stylus carried by one end of said lever, a transmitter free to rotate about the record and a connection between said transmitter and the other end of said lever, substantially as described.

9. A phonographic device having, in combination, a handle, a cylindrical record mounted thereon and having phonograms arranged spirally on the face thereof, a yoke mounted to turn on the handle and about the

record, a rocking lever mounted to move freely up and down on the bar of said yoke and bearing a stylus at one end, a transmitter free to be rotated about said record and a connection between said transmitter and the lever, whereby, when the transmitter is rotated, the stylus will be forced against and carried over the said spiral line of phonograms, substantially as described.

10. A phonographic device having, in combination, a handle, a phonographic record fixedly mounted thereon, a transmitter free to be rotated about said record, a stylus connected to said transmitter, a yoke adapted to hold the stylus to the record while allowing it to rotate about the same, the said record being spirally grooved for the reception of the stylus and having phonograms formed on the bottom of said groove, substantially as described.

11. A phonographic device having, in combination, a handle, a phonographic record and transmitter so combined that movement of one in respect to the other will be caused by whirling movement of the handle, and a stylus interposed between the record and transmitter, substantially as described.

12. A phonographic device having, in combination, a handle, a phonographic record and transmitter rotatable one in respect to the other, and so mounted that the transmitter is caused to rotate about the axis by whirling movement imparted to the handle, and a stylus interposed between the record and transmitter, substantially as described.

13. A phonographic device having, in combination, a handle, a phonographic record and transmitter rotatable one in respect to the other and so mounted that the transmitter is caused to rotate about the axis by whirling movement imparted to the handle, and a stylus interposed between the record and transmitter, the centrifugal force exerted by said transmitter tending to maintain the stylus in engagement with the record, substantially as described.

14. A phonographic device having, in combination, a handle, a phonographic record and diaphragm so mounted that whirling movement of the handle will cause movement of one of said parts about its axis, a stylus interposed between the record and diaphragm, and means independent of the groove of the record for causing the stylus to follow the convolutions of said groove, substantially as described.

Signed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, this 13th day of April, A. D. 1906.

EUGENE C. SMITH.

Witnesses:

KATE A. BEADLE,
JOS. H. KLEIN.





No. 836,510.

PATENTED NOV. 20, 1906.

I. KITSEE.
PRODUCTION OF SOUND RECORDS.
APPLICATION FILED AUG. 26, 1904.

2 SHEETS—SHEET 1.

FIG. 2.

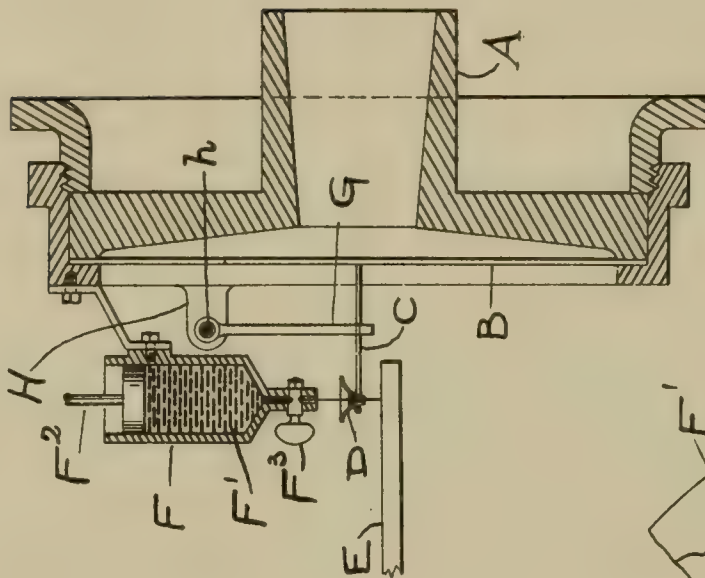
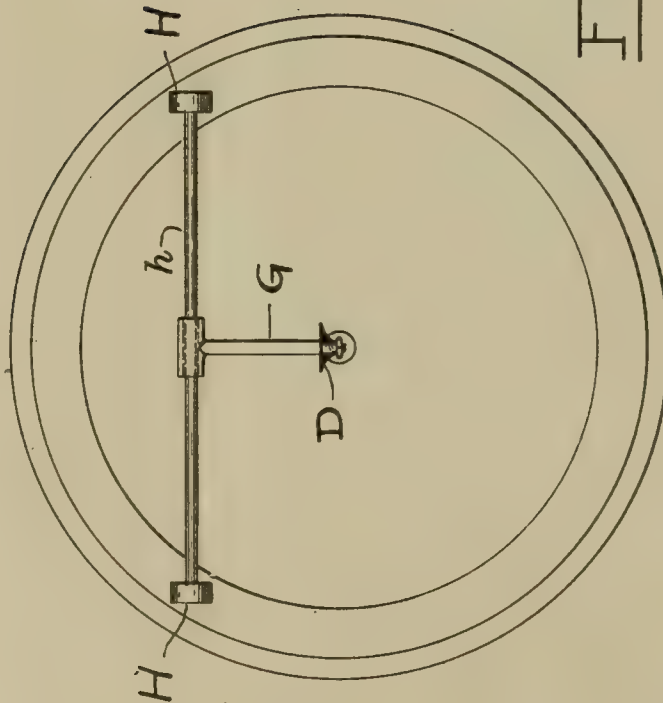


FIG. 3.

FIG. 1.



WITNESSES:

A. N. Cramer
Edith Q. Stille

INVENTOR.

I. Kitsee



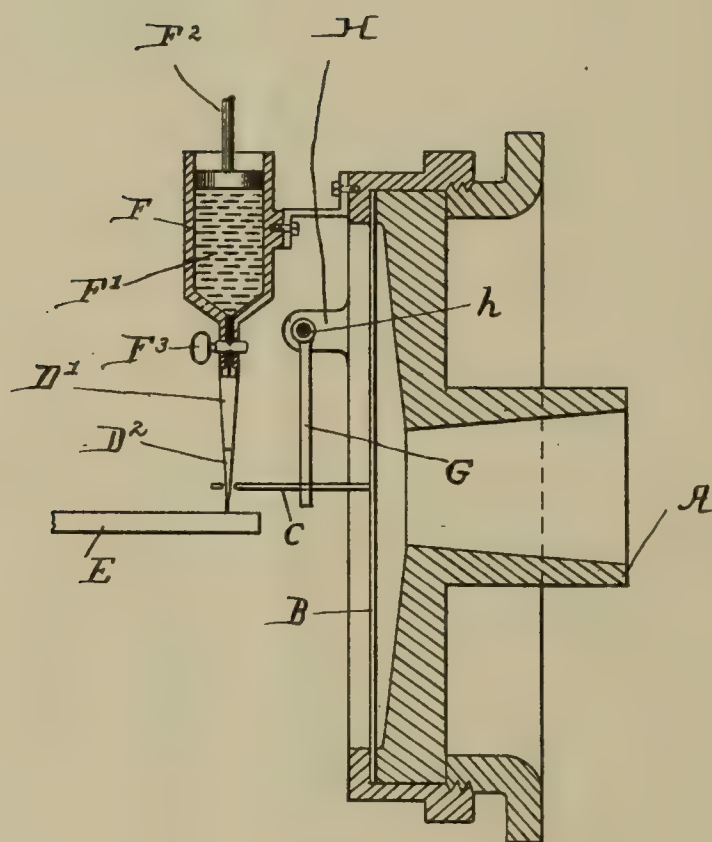
No. 836,510.

PATENTED NOV. 20, 1906.

I. KITSEE.
PRODUCTION OF SOUND RECORDS.
APPLICATION FILED AUG. 26, 1904.

2 SHEETS—SHEET 2.

Fig 4.



Witnesses
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H. C. Yetter

Inventor
I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PRODUCTION OF SOUND-RECORDS.

No. 836,510.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed August 26, 1904. Serial No. 222,287.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in the Production of Sound-Records, of which the following is a specification.

My invention relates to an improvement in the production of sound-records.

10 All sound-records are to-day produced by what is called the "cutting-stylus," and the systems now employed differ from each other in that one reproduces the sound-waves by the depth of the cut and the others repro-
15 duce these sound-waves by removing an etch-resisting film on a solid plate. In all these cases a resistance is offered to the movements of the stylus, and through this resistance these movements are greatly re-
20 tardated. The records therefore cannot reproduce the voice in its natural amplitude. It is the aim of my invention to obviate these difficulties.

The underlying principle of my invention
25 consists therein that an etch-resisting material is deposited on a solid surface in accordance with the vibrations of the diaphragm produced by the generated sound-waves, and as the most simple manner of depositing this
30 etch-resisting material consists therein that the same is dissolved in a fluid I prefer the following method: I first dissolve a shellac, rosin, or other free-dissolving etch-resisting material in a fluid, preferably one which
35 quickly evaporates, and I therefore prefer a solution of shellac in alcohol or rosin in hydrocarbon. I provide a stylus which is supported by the vibrating diaphragm of a re-
40 corder with an orifice and allow the etch-resisting fluid to issue from a reservoir in close proximity thereto. Beneath the stylus I then place the solid plate adapted to receive the record. The etch-resisting fluid should
45 issue from the reservoir in a very thin stream, and as the stylus, with its orifice, has to vibrate in accordance with the vibration of the diaphragm proper it is obvious that the liquid will be deposited on the solid surface in a manner so as to reproduce these vibrations.
50 After having deposited thereon the required recording-lines the plate is subjected to the process of etching, whereby such parts of the metallic plate as are not protected by the etch-resisting fluid will be depressed, leaving
55 such parts as are protected by the fluid in relief.

The so-prepared record-plate is in reality a negative of the sound-waves generated, and to produce from same a positive it is only necessary to apply to the surface of
60 said plate a plastic material capable of receiving impressions and hardening after such impressions are made.

Where it is desired that the evaporation of the etch-resisting fluid should be acceler-
65 ated, the solid plate may be through artificial means raised to the required temperature; but in some cases it may be preferred not to use any evaporating fluid, and in such cases I make use of wax heated so as to become
70 fluid, and in this case the reservoir from which this heated wax issues should always be kept at the required temperature; but the plate on which the wax is deposited may then be cooled by any of the well-known
75 means.

The great advantage of this process consists therein, first, that the stylus is not subjected to the retardation to which it is subjected in the processes of to-day, and, second,
80 that the original is produced in the negative, making it possible to produce directly therefrom any desired number of positives.

In order to explain my invention more clearly, I refer to the accompanying draw-
85 ings, which show preferred forms of apparatus for carrying out my process.

In the drawings, Figure 1 is a plan view of a diaphragm embodying my invention. Fig. 2 is a cross-section of a recording mechanism
90 with my invention attached thereto. Fig. 3 is a plan view of part of a record. Fig. 4 is a cross-section of a recording mechanism with my device in modified form.

A is the mouthpiece; B, the diaphragm; 95 C, the stylus, attached to the diaphragm. This stylus is partially supported by the movable lever G, attached to the bar *h*, held in position by the supports H.

So far the device may be a duplicate of the
100 usual phonograph; but instead of the stylus being provided with a cutting-point I substitute therefor a funnel D and place in juxtaposition to said funnel the reservoir F, containing the etch-resisting fluid F', and I
105 preferably provide this reservoir with the valve F³ and the compressing means F², which compressing means may be purely mechanical and may consist of either a weight or pneumatic pressure.

Beneath the orifice of the funnel D is placed the solid plate E, adapted to be moved in the

usual manner with any of the well-known means, and as my invention does not reside in this part of the apparatus it is unnecessary for me to further explain the same. E' shows the etch-resisting material deposited on the plate E.

I have shown in the drawings the funnel D; but as the office of this funnel is only to prevent an overflow of the fluid it is obvious that the end of the stylus itself may be so formed that the funnel can be dispensed with.

In some cases it is preferred that the fluid should issue directly from the reservoir onto the solid plate. This is more specially desired if the fluid consists of a molten etch-resister—such, for instance, as wax or paraffin—for the reason that the intervening air may cool the heated material to a greater extent than is desired before the same is deposited on the solid plate. In such cases it is best to employ means substantially as illustrated in Fig. 4, in which figure a flexible tube D', preferably made of rubber, is connected to the lower portion of the reservoir F and is provided at its lower part with a preferably-metallic nozzle D². This nozzle extends through a perforation in the stylus C, which then acts as a guide for the nozzle D². When, therefore, the diaphragm, with its appended stylus C, vibrates, it is obvious that the nozzle must follow these vibrations and in so doing must deposit the fluid on the solid plate E in a waved line in accordance with such vibrations.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of producing sound-records, which consists in depositing an etch-resisting material in accordance with the variations in the generated sound-waves on a surface capable of being etched, and then depressing such parts of the surface which are not protected by said material.

2. The method of producing a sound-record which consists in causing a free-flowing fluid to be deposited on a surface capable of being etched in accordance with the vibration of a diaphragm and afterward depress-

ing such parts of the surface which are not protected by said fluid.

3. The method of reproducing sound-waves in permanent records which consists in causing a free-flowing etch-resisting fluid to be deposited in accordance with the vibration of a diaphragm actuated by said sound-waves.

4. The method of producing sound-records without actual contact of the stylus connected to the diaphragm which consists in causing to be deflected the flow of a fluid in accordance with the vibration of said stylus and causing the so-deflected fluid to be deposited on a solid surface.

5. The method of reproducing sound-waves in permanent records which consists in causing through said sound-waves a diaphragm to vibrate, causing a free-flowing fluid to be deposited on a solid surface and causing through the vibration of said diaphragm said fluid to be deflected in a manner so as to reproduce said vibrations.

6. The method of reproducing records of sound-waves consisting therein that the flow of an etch-resisting fluid on a base adapted to be etched in is caused to be deflected through the vibration of a phonographic diaphragm in a manner so that the line formed by said fluid reproduces said vibrations and then etching in such parts of the base as are not protected by the line of fluid.

7. The method of producing sound-records without actual contact of the stylus connected to the diaphragm, which consists in causing the flow of a fluid to be deflected in accordance with the vibration of said stylus, causing the so-deflected fluid to be deposited on a solid surface, and then causing those parts of the surface not protected by said fluid to be differentiated in height from those parts protected by said fluid.

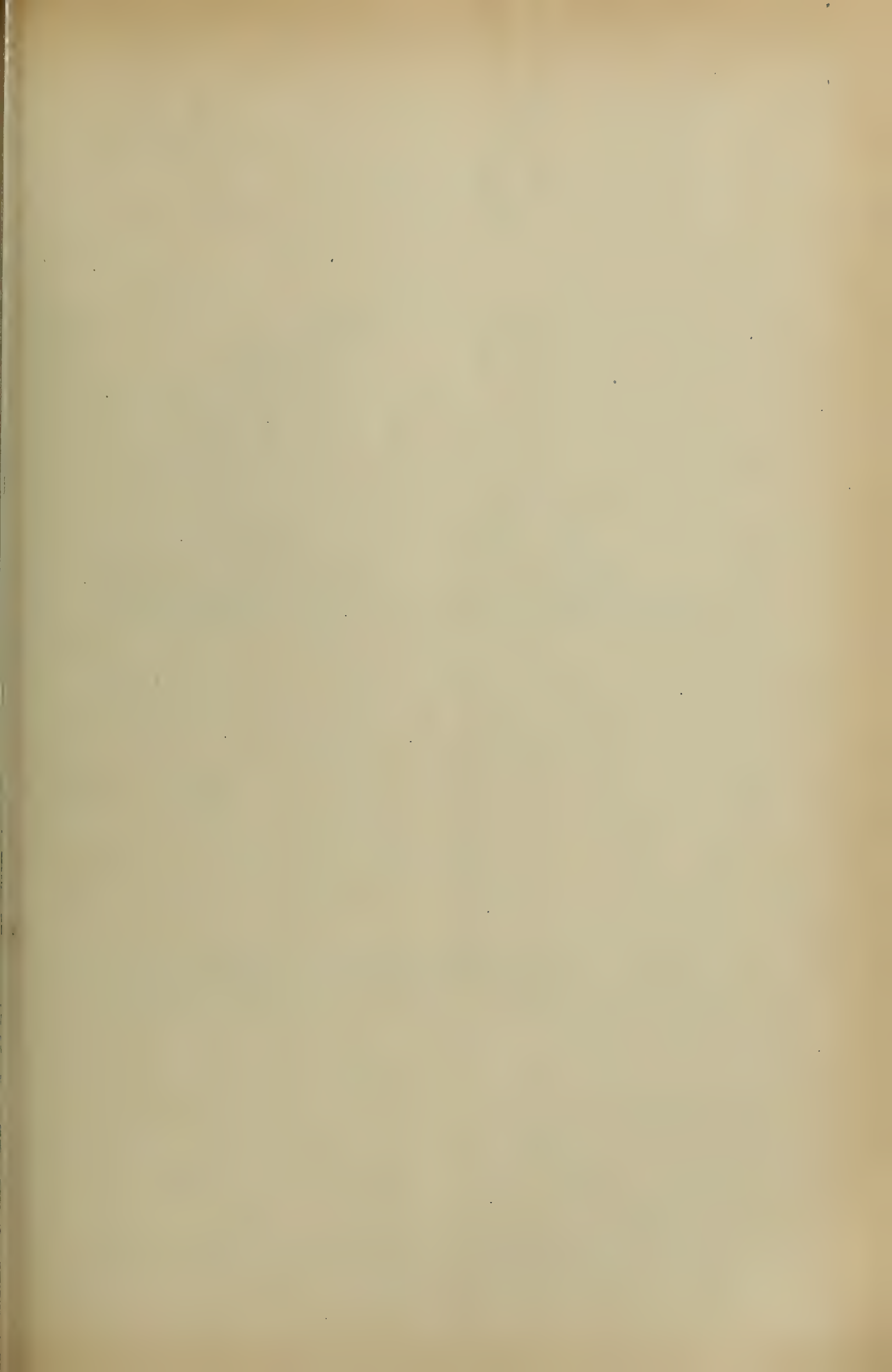
In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 24th day of August, A. D. 1904.

ISIDOR KITSEE

Witnesses:

EDITH R. STILLEY,

H. C. YETTER.



No. 836,646.

PATENTED NOV. 20, 1906.

T. H. MACDONALD.

PROCESS OF MANUFACTURING SOUND RECORDS.

APPLICATION FILED FEB. 29, 1904.

Fig. 1.

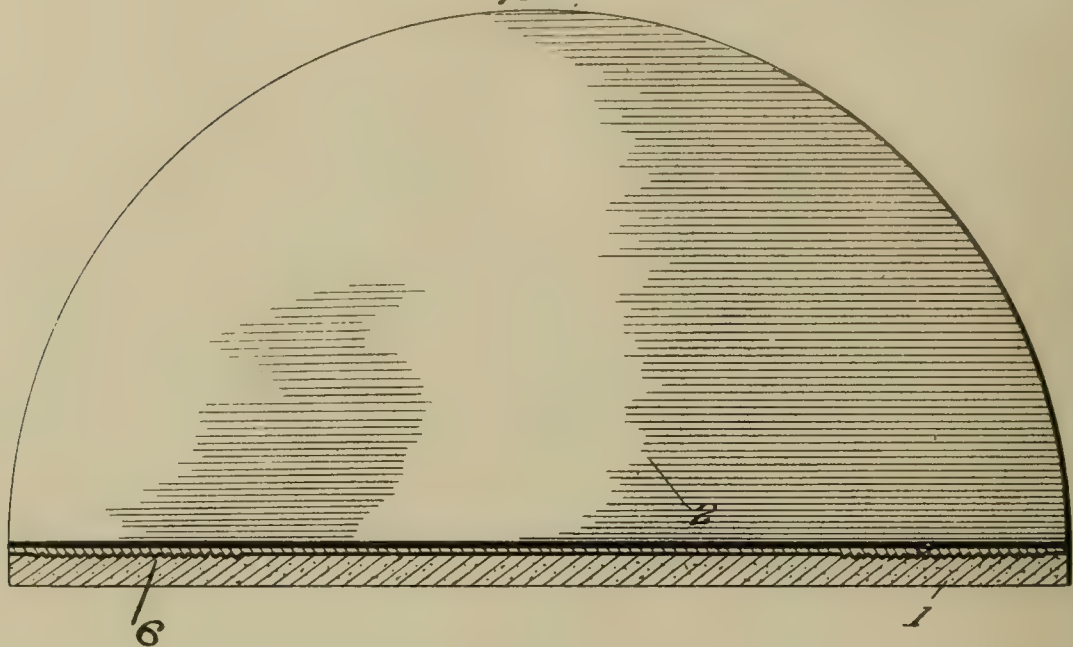
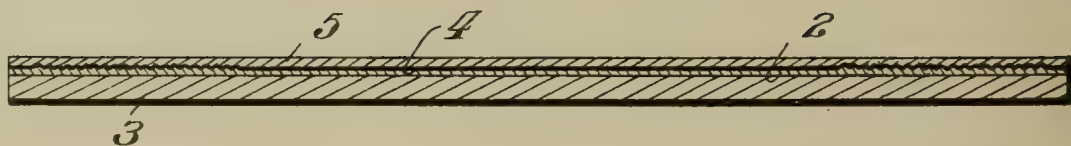


Fig. 2.



Witnesses

Wm. B. Kerram
Gustave R. Thompson

Thomas H. Macdonald Inventor

By *Charles Cameron Lewis* *Massie*
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT.

PROCESS OF MANUFACTURING SOUND-RECORDS.

No. 836,646.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed February 29, 1904. Serial No. 195,917.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Processes of Manufacturing Sound-Records, which invention is fully set forth in the following specification.

This invention relates to the production of sound-records in a metallic tablet, and more particularly to records of the disk form. Its object is to procure with commercial economy metallic sound-records of superior quality.

In carrying out the invention an original sound-record (preferably a record of varying depth) is made in the usual way—*i. e.*, by engraving upon a tablet of the ordinary wax-like material. From this original an electrotype master is made in the usual way—that is, by first coating the wax record with a coating of plumbago or other conducting material and then depositing thereon electrolytically a layer of suitable metal, such as copper. The copper master is separated from the wax original and after careful cleaning and polishing is plated with a plating of metal, such as silver, which is acted upon by a metalloid. This silver-plating is preferably applied by means of the “washing” method—*i. e.*, applied by a camel’s-hair brush—rather than by electrodeposition. The copper plate is thoroughly cleaned and a silvering paste brushed over its surface. This paste is prepared by dissolving silver nitrate in water, precipitating the silver in the form of a chlorid by means of common salt, washing the precipitate, and dissolving it in potassium cyanid. The solution is filtered, if necessary, and mixed with enough whiting to make a thin paste. In practice it is found that twenty-two parts of silver nitrate to forty-two parts of cyanid of potassium give good results. The metallic negative is now used for obtaining duplicates by the direct electrodeposition of the metal upon the silver-plated master or negative. To make this operation commercially successful, it is necessary that a separating-film should intervene between the negative and the electrodeposited positive or duplicate, so that the two may be separated without injury to either. This film must be exceedingly thin, so as not to obliterate or modify the form of the sound-vibrations, and it should be uniform, continuous, and capable of being readily applied and renewed. These and all other conditions

necessary to insure success are met by subjecting the silver-plated negative to the action of a chemical agent, such as the sulfid of an alkali or alkaline earth. Potassium sulfid has given the best results thus far obtained. Sulfur fumes have also been successfully used. In carrying out this part of the operation a weak solution of potassium sulfid prepared by dissolving one-half ounce of the sulfid in one gallon of water is flowed over the metal negative and at once poured off. This causes the formation of an exceedingly thin but uniform and continuous light-brown film of a sulfid of the metal acted upon, (in this case sulfid of silver.) The surface is then washed with clean water and placed in the plating-bath. A duplicate record of the desired thickness is now deposited electrolytically, copper being the metal preferred. The surfaces of the negative and positive can now be readily separated by introducing the blade of a knife between the edges at any point. The duplicates may be then polished and finished in any suitable way, as by nickel-plating. Duplicates made in this manner are not only very durable, but they have acoustical qualities of a very superior order, readily distinguishable by the ear from records made in wax or other plastic material. The noticeable characteristics are fidelity to the original sounds and a very rich and agreeable tone quality.

The formation of the separating-film (in the form of a salt or compound of the metal constituting the surface of the negative) may be accomplished in other ways. For example, the silver surface may be oxidized by heat or other method of oxidation and fair results obtained; but the best mode now contemplated of applying the principle of said invention is that stated above.

Other modifications will readily suggest themselves to persons skilled in the art to which the invention relates.

The negative can be used for the production of a large number of duplicates; but the separating-film must be renewed after every two or three duplicates.

For the purpose of graphically illustrating the invention reference is made to Figures 1 and 2 of the accompanying drawings, in which—

Fig. 1 is an isometric sectional perspective view showing a tablet with a record formed thereon having an electrodeposition superimposed upon the record-face of the

tablet, and Fig. 2 is a cross-sectional view showing the negative formed by the electrodeposition properly backed and a record electrically deposited thereon with a separating-film between the metallic negative and the record thus deposited.

Referring to Fig. 1 of the drawings, 1 represents a record-tablet of any suitable material, preferably wax or wax-like materials, having a sound-record formed thereon, which record in the drawings is indicated by the irregular line 6. This record-tablet having been suitably treated with some proper electrical conductor—as, for example, fine plumbago—is then placed in an electroplating-bath and a suitable metal 2—as, for example, copper—is then electrically deposited thereon in the usual way. The copper negative 2 thus formed having been removed from the wax tablet 1 is then preferably backed up by any suitable strengthening metal 3, Fig. 2—as, for example, type-metal—and the separating-film 4 (indicated by the dark line in Fig. 2) is then applied to the surface of the negative. The negative 2 thus backed up and provided with the separating-film 4 constitutes a metallic negative from which duplicates are obtained by the direct electrical deposition of metal 5 thereon in the usual way. The duplicate having thus been deposited upon the metallic negative is then readily separable from the metallic negative, this being rendered possible by the presence of the separating-film hereinbefore described.

By “separating-film” as herein used is meant a film which permits the actual bodily separation of the negative and the positive metallic record as distinguished from a layer of some substance which acts merely as a partition between the two bodies. By “separating the negative and positive” is not meant the destruction of the former, but the true bodily separation of the two intact.

What is claimed is—

1. The process of making metallic copies of sound-records by forming upon a metallic record-bearing surface a thin film by chemical treatment of said surface, electrodepositing a metallic plate on said film, and separating the two metallic bodies.

2. The process of making metallic sound-records by forming on a metallic record-bearing surface a thin separating-film of a metallic oxid or compound, depositing thereon by electrolysis a plate of suitable metal, and separating the two metallic bodies.

3. The process of making metallic duplicate sound-records by forming upon a metallic negative of disk form by acting chemically

upon the surface thereof, a separating-film, electrodepositing thereon a plate of suitable metal, and bodily separating the negative and positive.

4. The process of making metallic duplicate sound-records by acting upon the surface of a metallic record-bearing surface with an agent such as potassium sulfid, thereby forming a film so thin as not to impair the form of the recorded vibrations, depositing electrolytically a layer of metal thereon, and bodily separating the two metallic bodies.

5. The process of making duplicate sound-records by forming a silver-plated negative, treating the surface thereof to form a thin coating of a compound of silver, then electrodepositing a layer of metal on said film, and separating the duplicate from said negative.

6. The process of duplicating sound-records by forming a metallic negative, forming thereon a sulfid of the metal whereof the surface of said negative is formed, electrodepositing a positive thereon, and separating the negative and positive.

7. The process of making sound-records by forming a metallic negative, treating the same with a solution of an alkali or alkaline-earth sulfid, depositing a positive thereon, and separating the negative and positive.

8. The process of making sound-records by forming a silver-plated metallic negative, treating the same with a solution of an alkali or alkaline-earth sulfid, depositing a positive thereon, and separating the negative and positive.

9. The process of making sound-records by forming a silver-plated metallic negative, treating the same with a solution of potassium sulfid, depositing a positive thereon, and separating the negative and positive.

10. The process of making sound-records by forming a silver-plated record-surface, forming thereon a thin coating of a compound of silver, depositing a metallic layer thereon, and separating the two layers.

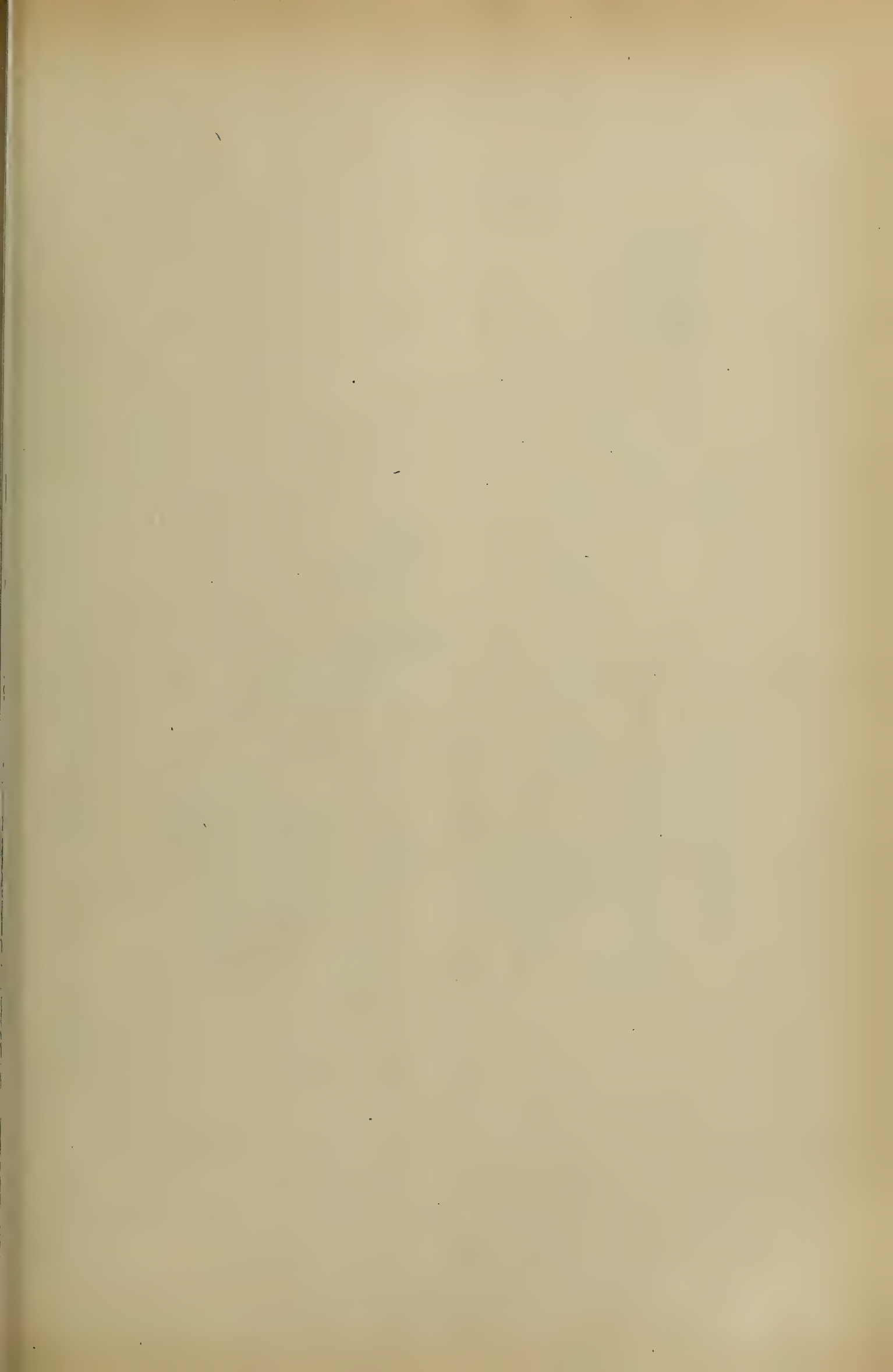
11. The process of making metallic sound-records by forming a metallic record-bearing surface, forming thereon a sulfid of the metal whereof said surface is composed, electrodepositing a metallic layer thereon, and separating the two metallic bodies.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

C. B. INGALLS,
A. B. KEOUGH.



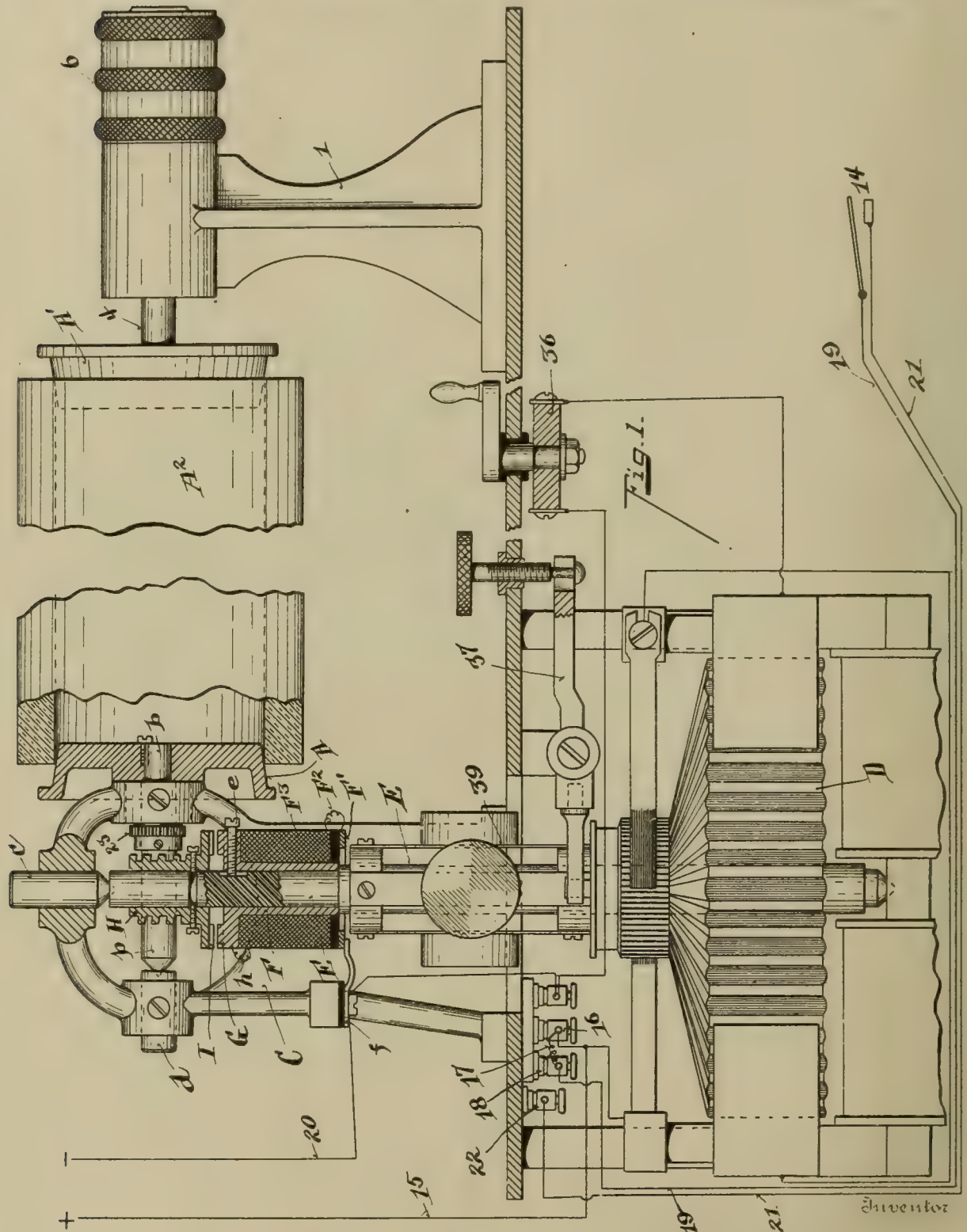
No. 836,940.

PATENTED NOV. 27, 1906.

C. W. NOYES.
PHONOGRAPH.

APPLICATION FILED DEC. 15, 1903. RENEWED OCT. 17, 1906.

3 SHEETS—SHEET 1.



Witnesses

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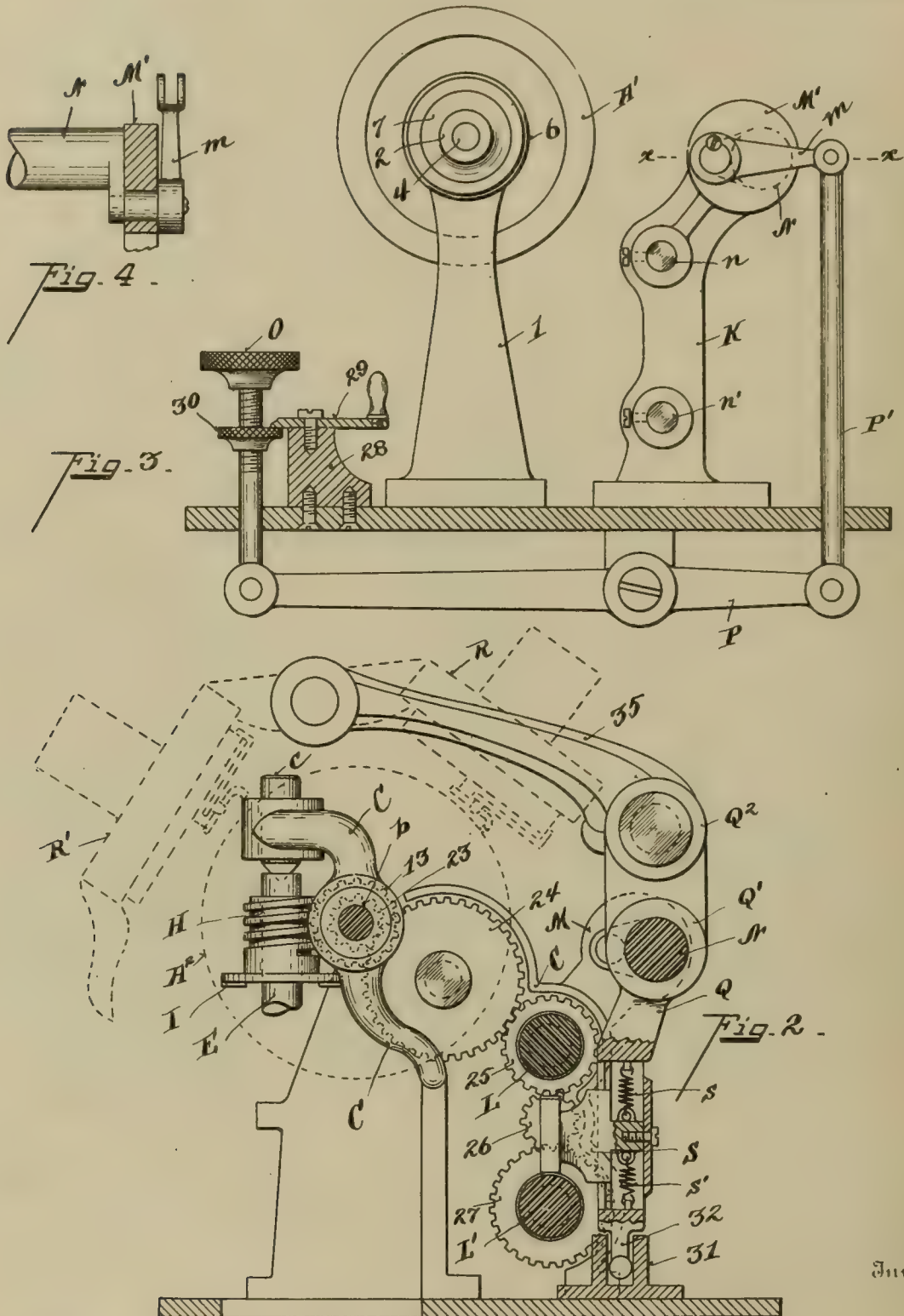
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3 SHEETS—SHEET 2.



Inventor

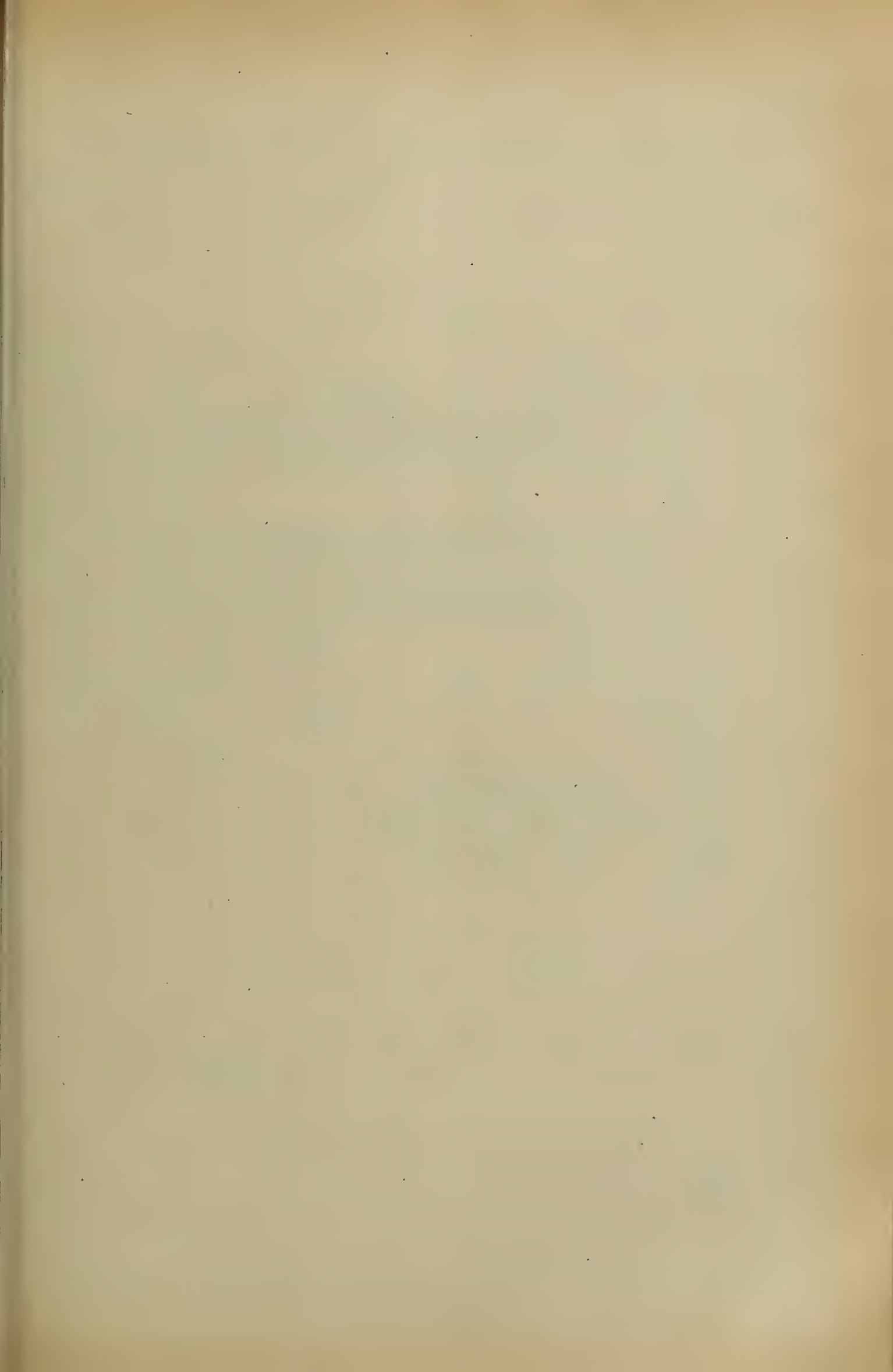
Witnesses

Oliver B. Kaiser
Luise Beck

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Charles W. Noyes

Attorneys



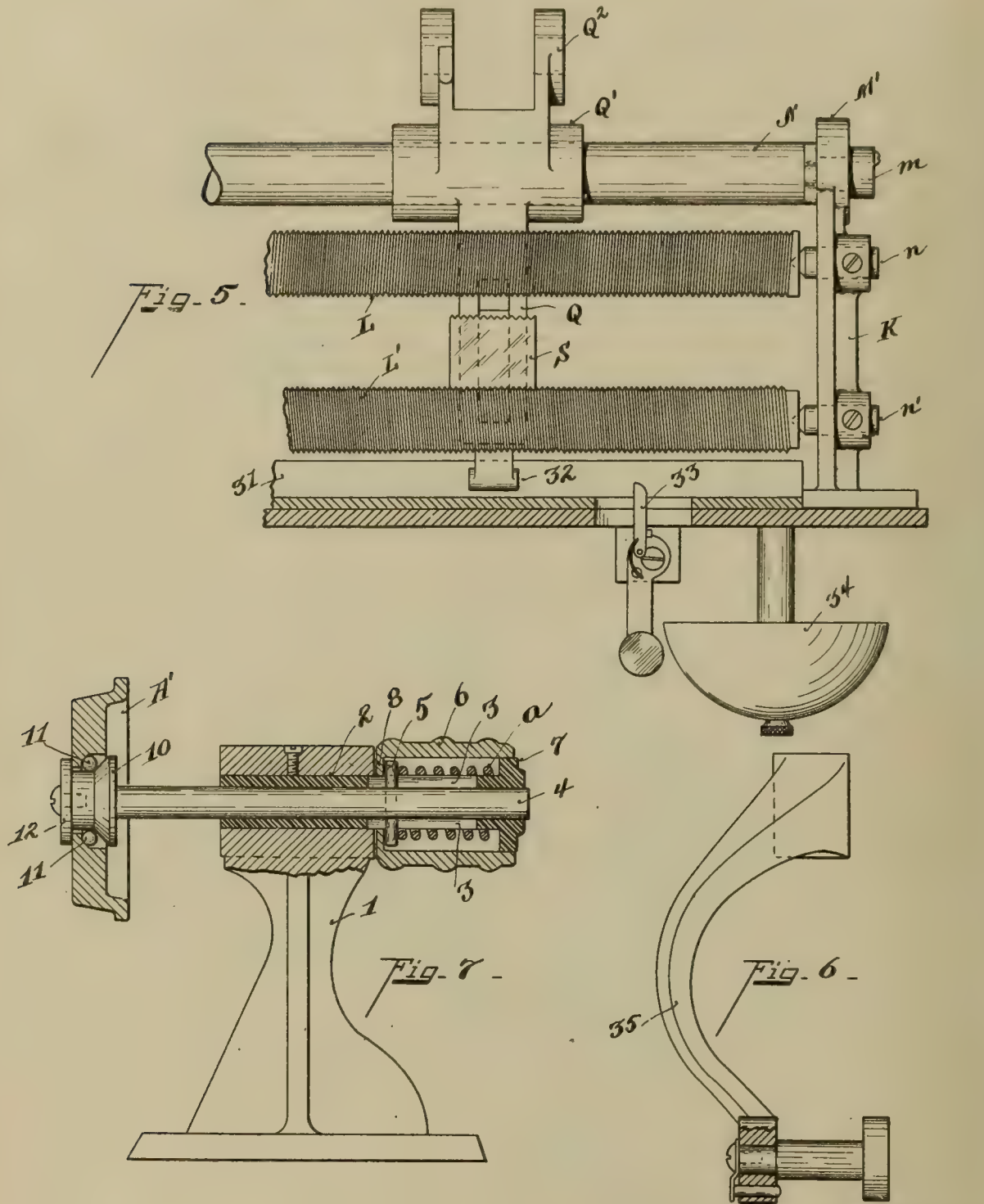
No. 836,940.

PATENTED NOV. 27, 1906.

C. W. NOYES.
PHONOGRAPH.

APPLICATION FILED DEC. 15, 1903. RENEWED OCT. 17, 1906.

3 SHEETS—SHEET 3.



Inventor

Witnesses

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Louis Beck

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Wood Wood

Attorneys

UNITED STATES PATENT OFFICE.

CHARLES W. NOYES, OF CINCINNATI, OHIO, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION.

PHONOGRAPH.

No. 836,940.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed December 15, 1903. Renewed October 17, 1906. Serial No. 339,395.

To all whom it may concern:

Be it known that I, CHARLES W. NOYES, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to an improvement in phonographs.

10 Primarily the object of my invention is to devise a machine particularly organized and adapted for office amanuensis and known to the trade as the "commercial" phonograph.

15 One of the objects of my invention is to provide means in connection with the main drive of the record, reproducer, and the recorder which is under the full control of the operator when in use, so that it can be instantly started and stopped.

20 Another object of my invention is to provide improved means for supporting the record-cylinder.

25 Another object of my invention is to provide means for readily inserting and withdrawing the record and maintaining a constant initial position without destroying or varying its accuracy relative to the reproducer or recorder.

30 Various other features of my invention are set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a central sectional view, partly in elevation, illustrating the 35 main drive for the various parts, together with the electrical connections. Fig. 2 represents a cross-sectional view showing a portion of the main power driving-shaft in connection with a train of gears for traversing the recorder and reproducer mechanism. Fig. 3 is an end elevation, partly in section, showing the means for operating the reproducer and recorder traversing mechanism for controlling the direction of traverse. Fig. 4 45 is a section on line *x x*, Fig. 3. Fig. 5 is a front elevation of a portion of the traversing mechanism for the reproducer and recorder. Fig. 6 is a top plan view, partly in section, of the recorder and reproducer supporting arm. 50 Fig. 7 is a central vertical section of the tail-stock for supporting the record.

I will first describe my improved means for supporting the record-cylinder.

In the conventional phonograph taper mandrel-supports are employed. The record 55 being a hollow cone brings two opposite tapered bodies into engagement. Both the record and the mandrel are liable independently to contraction and expansion, which obviously is constantly varying, and so destroying the accuracy of supporting the record 60 relative to the mandrel. However slight may be the variation, it will be sufficient to affect the meeting taper surfaces, so that the record is constantly varying in position longitudinally of the machine. As a result of this variability the reproducer must be constantly shifted to different initial positions, and there is no assurance of starting a reproducer with a given record at the proper 70 place. To avoid this, I employ a plain cylindrical record, into the opposite ends of which are fitted the driving taper disks A A'. These disks, it will be understood, compare to the live and dead center of the machine-tool, one of them being rotated and the other 75 being free to rotate on its own axis under the influence of the record.

A represents the head-stock disk, and A' the tail-stock disk. The tail-stock disk is 80 supported as follows: 1 represents the tail-stock having a bore, into which is secured a sleeve 2, said sleeve being provided with oblong slots 3. 4 represents a spindle loosely supported within the sleeve 2, provided with 85 a pin 5, fixed thereto, the ends of the pin projecting through the oblong slots 3. 6 represents a sleeve loosely journaled on a flange 7 of sleeve 2 at one end and having an inwardly-projecting flange 8 at its opposite end, 90 loosely bearing upon the sleeve 2. *a* represents a coil-spring bearing at one end against the flange 7 of the sleeve 2 and at its opposite end against the pin 5. Thus as the sleeve 6 is moved to the right it will carry 95 with it spindle 4, the spring *a* normally forcing the spindle in a direction toward the driving-disk. The spindle 4 is provided with a cone 10, the disk A' being provided with a central bore and race, forming one seat for 100 the balls 11 and the cone 10 the other. 12 represents a washer secured to the spindle 4 for holding the disk A' in position on the spindle 4. By this means a free revolution of the disk A' is obtained independent of the 105 longitudinal manipulating means, yet at the

same time permitting the disk to be moved longitudinally with the spindle 4 when inserting or withdrawing the record. With these tapered disks engaging the interior periphery of the record-cylinder at each end the position of the said record will be invariable, the opposite disk taking up the expansion or contraction without varying the longitudinal position of the record. As a result the reproducer has a constant initial position, which avoids a great deal of vexation and delay in the manipulation of the instrument.

I will now describe the mechanism and organization for driving the head-stock taper disk. This head-stock taper disk is fixed to the spindle *b*, suitably journaled in the standard C.

D represents the motor.

E represents an armature-shaft extending upwardly, the upper end of which is journaled upon the spindle *c*, supported in the standard C. The front end of the spindle *b* also has a pivotal engagement with the stud *d*, also supported in said standard C.

F represents a magnet-core, through the center of which the armature-shaft E passes. The said magnet is fixed to rotate with said armature-shaft by the set-screw *e*. This set-screw passes through the magnet-core and its end engages into a vertical slot in the periphery of the armature-shaft, which permits the magnet to be raised and lowered relative to the armature-shaft. The upper end of this magnet-core is provided with a clutch member G. In the preferred form the armature-shaft is vertically disposed, and the clutch member G is splined thereon, so as to slide thereon vertically and to turn therewith. As a result of this arrangement clutch member G drops of its own weight when the magnet is deenergized, thus throwing the clutch members out of driving relation.

H represents a worm-sleeve journaled on the upper end of the armature-shaft and revoluble independently thereon. The lower end of said worm-sleeve has a clutch member I, forming the cooperating clutch element to the magnet clutch member G. The spindle *b* is provided with a worm-wheel 13, engaging into the said worm-sleeve. (See Fig. 2.)

f represents a contact secured to the standard C and insulated therefrom, having connection with a ring F', secured to the lower portion of the magnet and insulated therefrom. Said ring F' is connected by wire F² to one end of the magnet-coil F³. The opposite end of the magnet-coil is connected by wire *h* to the magnet-core F. Thus one pole of the electric energy has connection with the contact *f*, the opposite pole being through the armature-shaft and standard of the motor D. This magnet is energized and deenergized by a push-button 14, preferably located at some point below the machine,

where it may be operated by the foot of the operator. The magnet receives its energy from a series connection with the feed, as shown in Fig. 1, as follows: 15 represents the positive wire from the main source of supply extended to the binding-post 16, secured to the base of the machine and insulated therefrom, having a cross connection by wire 17 to the binding-post 18, thence by wire 19 to one pole of the push-button or switch 14. 20 represents the negative wire from the main source of supply connecting with the contact *f*. 21 represents a wire in connection with binding-post 22, secured to the base of the machine, which is of metal, but not insulated therefrom, said wire 21 extending to the other pole of the push-button 14, thus forming the partial circuits for the magnet, completed when the push-button or switch 14 is closed.

As shown in Fig. 1, the magnet is normally deenergized and the clutch members disengaged. When the operator depresses the push-button, the magnet will rise and bring the clutches in driving relation, thereby rotating the driving taper disk through the worm sleeve and wheel. When the foot is removed from the button, the drive and spindle stops. Obviously this is a very simple and convenient drive.

I will now describe the mechanism for traversing the reproducer and recorder.

K represents a journal-bracket erected on the platform of the machine in any suitable manner for supporting the traverse-screws L L' by spindle *n n* at one end, the opposite ends of the feed-screws being journaled in the standard C. These feed-screws are preferably oppositely threaded and driven in the same direction, whereby they are adapted to feed the reproducer or recorder in opposite directions. Obviously the same result might be obtained by having them correspondingly threaded and driven in opposite direction or having one traverse screw provided with a reversing-gear adapted to change the direction of the traverse-screw. On the spindle *b* is a gear-wheel 23. Suitably journaled on the standard C or head-stock is a transmitting-gear 24, in mesh with gear-wheel 23 and also with the gear-wheel 25 on the traverse-screw L. Journaled on the standard C is an intermediate gear 26, intermeshed with the gear-wheel 25 and with gear-wheel 27 on the forward screw L'. Rearwardly projected from the standard C is a bracket projection.

M M' represent a projection from bracket K in the rear of the tail-stock 1.

N represents a guiding-rod eccentrically mounted in the brackets M M' and provided with a crank-arm *m* at the outward side of bracket M'. O represents a push-button at the front of the machine extending upward from the platform connected by a link-and-lever mechanism P P' to the said crank-arm

m of the guiding-rod *N*. Between the bracket and upon said eccentric rod the recorder and reproducer traversing mechanism is slidably mounted.

5 *Q* represents a downward-extending traversing arm provided with a sleeve *Q'*, sliding on the rod *N*. Said arm is provided with an elongated slot, into which is gibbed a rack *S*, having vertical movements therein.

10 *s s'* represent springs secured to the arm at one end and to the rack at their opposite ends for delicately supporting the rack between the traverse-screws *L L'* and adapted to normally engage the direct-feed screw.

15 When the push-button is depressed, the eccentric rod *N* is vertically raised, lifting the traversing mechanism bodily, thereby raising the recorder and reproducer supported thereon from the record. At the same
20 time the rack, which is provided with upper and lower screw-faces of the same pitch as the traverse-screws and at which depression the upper face of the rack is brought into engagement with the feed-screw *L*, thereby trav-
25 ersing the reproducer and recorder in the reverse direction free from the record. Thus at any instant the operator may cause the recorder to be shifted toward initial position for repeating the message. The reversing
30 traverse-screw is also preferably higher speeded than the direct traverse-screw, enabling the operator to make a quick return shift.

It is sometimes desirable to hold the trav-
35 ersing mechanism free from either of the screws or to positively hold the rack of the traversing mechanism in positive engage-ment with one of the screws, and this is ac-
40 complished by the following instrumentalities: 28 represents a bracket secured to the bed-plate of the machine. 29 represents a lever pivoted on said bracket. 30 represents a knurl screw-threaded onto the stem of the
45 push-button *O*. Thus by adjusting this knurl 30 upon the stem the link-and-lever mechanism can be adjusted permanently for such time as desired by swinging the lever 29 in engagement with the knurl 30, as shown in Fig. 3.

50 31 represents a guide of the same length as traverse-screws *L L'*, into which the projec-tion 32 of the traversing arm *Q* extends, thereby providing a lower guiding means for the traversing mechanism, said projection 32
55 also serving for the purpose of operating the tripping mechanism 35 for sounding the bell 34 at the end of the traversing point. The traversing arm *Q* is provided with upwardly-extending yoke-arms *Q²*, to which the re-
60 corder and reproducing supporting arm 35 is pivoted, said arm extending over the record *A²*, as shown in Fig. 2, the record being shown in dotted lines.

In Fig. 2 I have shown in dotted lines a re-

producer *R* and a recorder *R'*, of duplex form, 65 mounted upon the arm 35, which is made the subject of a separate application and not a part of this invention.

If the phonograph is to have an extended 70 field of utility in commercial life, it is ob-vi-ous that the instrument must at all times be under perfect control of the operator and also that the controlling instrumentalities must be in such easily-accessible position as to give the operator such control without un- 75 necessary inconvenience. As the operator is transcribing the message, probably on a type-writer, it is desirable to manipulate the phonograph with the least possible move- 80 ment of the hands from the keys of the type-writer. By means of the improvements here described the operator can start, stop, and reverse the machine at will and with little or no added inconvenience. Of course 85 in reversing, the hand may be taken from the keys, as the record is not in position during the rearward traverse of the reproducer.

36 represents a switch for controlling the motor-current.

37 represents the usual form of means for 90 controlling the speed of the motor *D*, having connection with the governor 39, mounted on the main driving-shaft *E*.

Various means not shown might be em- 95 ployed to produce the equivalent of the or-ganization I have illustrated as the preferred form without departing from the principles of my improvement. Therefore I do not limit myself to the preferred form, except as specifically claimed. 100

Having described my invention, I claim—

1. In a phonograph, a driving-shaft, means for rotating the same, record-rotating and reproducer-traversing means, trans- 105 mitting devices between said means and the driving-shaft, a magnet-clutch adapted to connect the driving-shaft with said trans-mitting devices when said magnet is ener-gized, means for automatically returning the clutch to normal idle position when it is de- 110 energized, an electric circuit for energizing the clutch and a switch placed in said circuit in proximity to the foot of the operator whereby the instrument may be maintained in commission while the operator retains his 115 foot on the switch, substantially as described.

2. In a phonograph, a main driving-shaft, means for conveying power to said shaft, record-supporting means having driven con- 120 nection with said driving-shaft, recorder and reproducer traversing mechanism, means for traversing the same, in driven connection with said driving-shaft, a loose clutch mem-ber on said shaft, a coöperating clutch mem- 125 ber fixed to turn with and slide on said shaft, a magnet supported by said fixed clutch member, partial circuits in connection with said magnet and means whereby said partial

circuits may be closed for bringing into engagement said loose and fixed clutch members, substantially as specified.

3. In a phonograph, a main driving-shaft being driven by a suitable power, a record-support, a shaft for rotating the same, a combined worm and clutch member loosely mounted on said shaft, transmitting devices between said worm and said record-shaft, a cooperating clutch member fixed to turn with and slide on said shaft, adapted to be engaged with said loose clutch member and worm for conveying power thereto, and means for engaging the same, substantially as described.

4. In a phonograph, a main driving-shaft, being driven by a suitable power, a record-support, a shaft for rotating said support, a combined worm and clutch member loosely mounted on said shaft, transmitting devices between said worm and said record-rotating shaft, a cooperating clutch member fixed to turn with and slide on said shaft, revolving therewith, and adapted to be engaged with said loose clutch member and worm, for conveying power thereto, a magnet-coil supported by said fixed clutch member and forming a magnet, partial circuit connections with said magnet, and means whereby said partial circuits may be closed for bringing into engagement said loose and fixed clutch members, substantially as specified.

5. In a phonograph, a main driving-shaft, a record-support, a shaft for rotating said support having driven connection with a suitable power, transmitting devices between said driving and said record-rotating shafts, a combined driving and clutch member loosely mounted on said shaft, a cooperating clutch member fixed to turn with and slide on said shaft, adapted to be brought into engagement with said loose clutch member for conveying power thereto, a magnet, supported by said fixed clutch member around said shaft, partial electric circuits in connection with said magnet and shaft, a foot push-button in connection with one of said partial circuits, whereby when the same is closed, the said fixed clutch member may be brought into engagement with the loose clutch member, substantially as specified.

6. In a phonograph, a main driving-shaft, means for conveying power to said shaft, a combined driving and clutch member loosely mounted on said shaft, record-supporting means, power-transmitting devices between said driving member and said record-supporting means, recorder and reproducer traversing mechanism, means for actuating the same, a cooperating clutch member fixed to turn with and slide on said shaft, movably mounted thereon and revolving therewith, a magnet supported by said fixed clutch member, partial electric circuits in connection with

said magnet and shaft, means for closing said partial circuits, for bringing into engagement the fixed clutch member with the loose clutch member for driving the same, substantially as specified.

7. In a phonograph, a main driving-shaft, suitably mounted within a record, supporting head-stock means for conveying power to said shaft, record-supporting means comprising two disks, one disk being journaled in said head-stock in driven connection with said driving-shaft for revolving the record, a tail-stock for supporting the other disk, a sleeve secured in said tail-stock provided with oblong notches, a spindle loosely supported within said sleeve, provided with a pin projecting through said slots in said sleeve, a second sleeve loosely mounted over said first sleeve provided with a flange for engaging said pin for moving the spindle longitudinally, a spring for maintaining the spindle in its normal position, and a disk revolubly mounted upon and having longitudinal movement with said spindle for inserting and withdrawing a record, substantially as described.

8. In a phonograph, a main driving-shaft, means for conveying power to said shaft, record-supporting means having driven connection with said driving-shaft, forward and reverse traverse-screws, having driven connection with said driving-shaft, a guide-rod eccentrically mounted upon suitable brackets in proper relation to said traverse-screws, a traverse-arm for supporting a recorder or reproducer, slidably mounted upon said guide-rod, comprising a rack delicately supported on said traverse-arm and between said traverse-screws, means for operating said guide-rod for raising and lowering said traverse-arm for alternately bringing into engagement said rack with either of said traverse-screws, substantially as specified.

9. In a phonograph, a main driving-shaft, means for conveying power to said shaft, record-supporting means having driven connection with said driving-shaft forward and reverse traverse-screws, having driven connection with said driving-shaft, a guide-rod eccentrically mounted upon suitable brackets in proper relation to said traverse-screws, a traverse-arm for supporting a recorder or reproducer slidably mounted upon said guide-rod comprising a rack delicately supported on said traverse-arm and between said traverse-screws, means for operating said guide-rod for raising and lowering said traverse-arm, alternately bringing into engagement said rack, with either of said traverse-screws and simultaneously raising and lowering a recorder and reproducer, supporting-arm mounted on said traverse-arm whereby said recorder and reproducer are brought into and out of engagement with the record, substantially as specified.

10. In a phonograph, a main driving-shaft, means for conveying power to said shaft, record-supporting means, having driven connection with said driving-shaft forward and reverse traverse-screws, having driven connection with said driving-shaft, a guide-rod eccentrically mounted upon suitable brackets in proper relation to said traverse-screws, a traverse-arm for supporting a recorder or reproducer slidably mounted upon said guide-rod comprising a rack delicately supported on said traverse-arm and between said traverse-screws, means for operating said guide-rod for raising and lowering said traverse-arm, alternately bringing into engagement said rack, with either of said traverse-screws and simultaneously raising and lowering a recorder and reproducer supporting arm mounted on said traverse-arm whereby said recorder and reproducer are brought into and out of engagement with the record, means for positively maintaining said guide-rod in any adjusted position, substantially as specified.

11. In a phonograph, a main driving-shaft, being driven by suitable power, a combined driving and clutch member loosely mounted on said shaft, a cooperating clutch member fixed to turn with and slide on said shaft, adapted to be brought into engagement with said loose clutch member for conveying power thereto, means for electrically operating said fixed clutch member into and out of engagement with said loose clutch member, record-supporting means, power-transmitting devices connecting said loose clutch member to said record-supporting means, traversing mechanism having driven connection with said driving-shaft, a guide-rod, supported on suitable brackets in proper relation to said traverse mechanism, a traverse-arm for supporting a recorder or reproducer slidably mounted upon said guide-rod and provided with means engaging said traverse mechanism, for traversing the same, means for raising said traversing arm whereby said recorder and reproducer are brought into and out of

engagement with the record, and means for reversing the travel of said traversing mechanism, substantially as specified. 50

12. In a phonograph, a source of power, a driving-shaft, record-supporting mechanism having driven connection therewith, reproducer or recorder traversing mechanism having driven connection therewith, clutch members controlling the power transmission, a magnet for operating said clutches, circuit connections for the magnet and a switch, whereby the instrument is operated when the circuit is closed, substantially as described. 60

13. In a phonograph, a vertically-disposed driving-shaft, horizontally-disposed record-supporting means, a loose clutch member on said shaft having driving connection with the said record-supporting means, a cooperating clutch member fixed to turn with said shaft, and slide vertically on said shaft, an electromagnet for one clutch member adapted to magnetically attract the cooperating clutch member whereby the vertically-movable clutch member is lifted when the magnet is energized, and drops by a gravity when the magnet is deenergized, substantially as described. 70

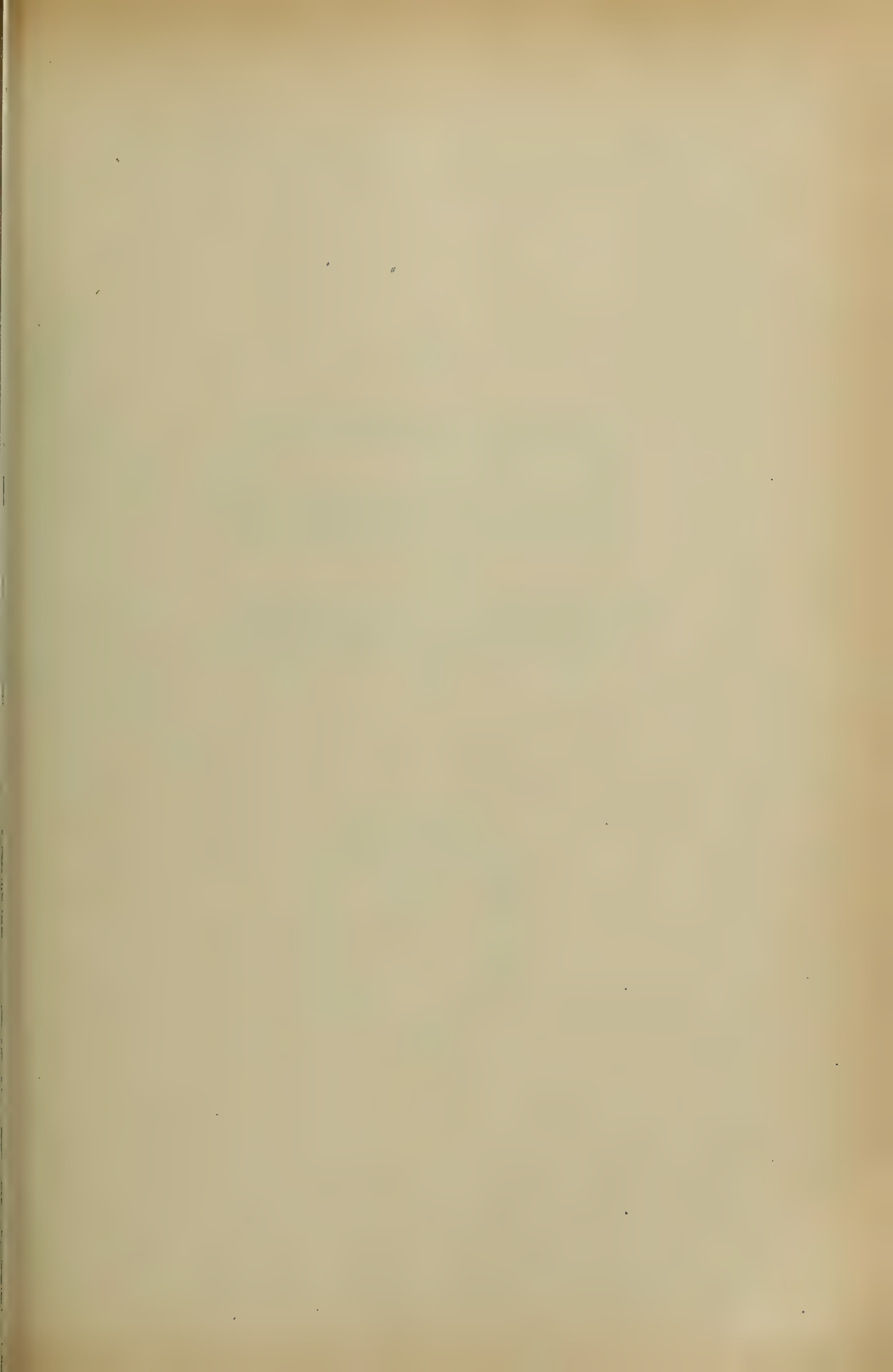
14. In a phonograph, a driving-shaft, means for rotating the same, a record-rotating shaft, transmitting devices between said shafts comprising a magnet clutch mechanism, an electric circuit and source of electricity for energizing said magnet and shifting one of said clutch members, means for automatically unshifting said clutch members when the magnet is deenergized, and a switch in the said circuit under the control of the operator whereby the said record-rotating shaft may be stopped and started independent of the said driving-shaft, substantially as described. 85

In testimony whereof I have hereunto set my hand.

CHARLES W. NOYES.

Witnesses:

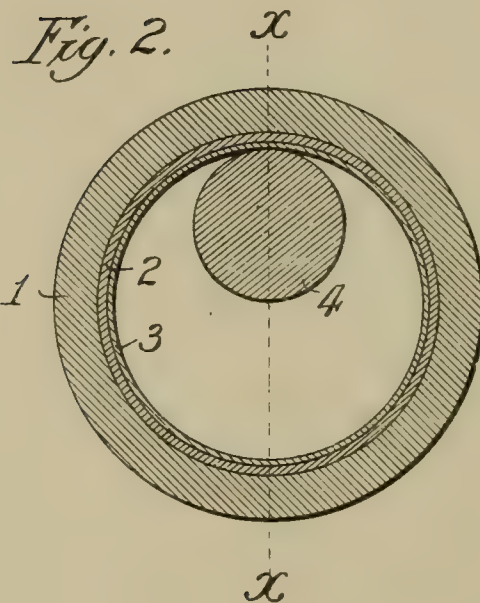
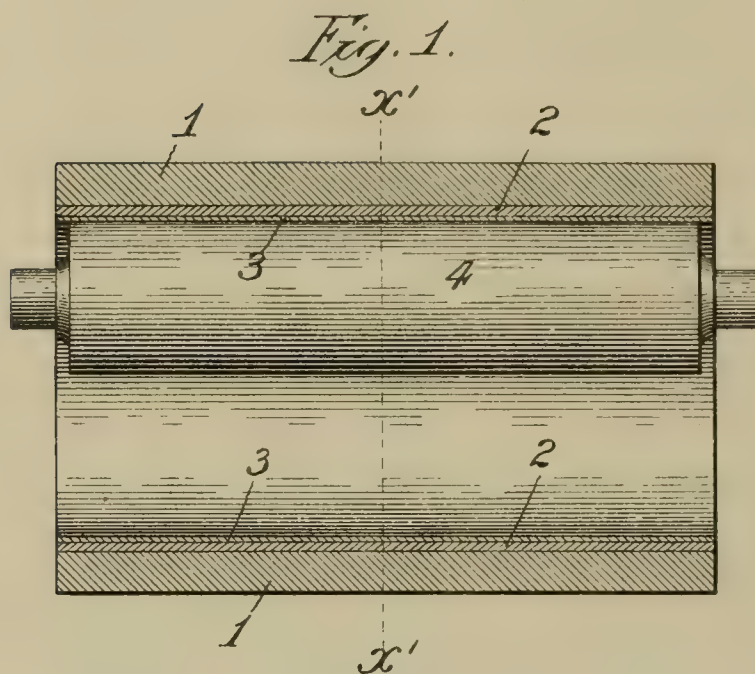
OLIVER B. KAISER,
LUISE BECK.



No. 837,061.

PATENTED NOV. 27, 1906.

V. M. HARRIS.
DUPLICATING PHONOGRAPH RECORDS.
APPLICATION FILED APR. 11, 1904.



Attest:
John Enders
M. H. Holmes

Inventor:
Varian M. Harris
by Robert Burns
Attorney.

UNITED STATES PATENT OFFICE.

VARIAN M. HARRIS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH TO
ROBERT BURNS, OF CHICAGO, ILLINOIS.

DUPLICATING PHONOGRAPH-RECORDS.

No. 837,061.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed April 11, 1904. Serial No. 202,515.

To all whom it may concern:

Be it known that I, VARIAN M. HARRIS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Duplicating Phonograph-Records, of which the following is a specification.

The present invention relates to that method or process of manufacturing duplicate phonograph-records of celluloid or other like material in which a mold is used having a negative matrix formed in its interior surface or bore and into which negative-matrix surface the duplicate phonograph-record in the form of a thin-walled cylinder is pressed to impart to the periphery of such cylinder a positive impression from such negative-matrix surface; and the object of the present improvement is to provide a simple and efficient method for use in the manufacture of their cylindrical phonograph-records and with which the production of the duplicate records can be effected in a rapid, certain, and positive manner, all as will hereinafter more fully appear and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present invention, Figure 1 is a longitudinal section on line $x x$, Fig. 2, of an apparatus adapted to carry out the present method; Fig. 2, a transverse section of the same at line $x' x'$, Fig. 1.

Similar numerals of reference indicate like parts in both views of the drawings.

Referring to the drawings, 1 represents the main mold body or backing of any usual suitable external form and of the required length and which is formed with a longitudinal central bore, as shown; 2, a negative matrix, of metal or other like hard substance, having a cylindrical form and fitted or fixedly secured within the bore of the main mold body or backing 1, as a lining. Such negative matrix will have its interior surface formed into a negative matrix in any usual manner, either by the electrolytic or other methods now generally employed in the present art.

3 represents the thin cylindrical record-blank in place within the mold and in readiness to be formed into a completed record by the present apparatus.

4 is a pressure-roller of a cylindrical form, having a uniform diameter along its entire

length and which is arranged longitudinally within the bore of the mold and blank, with its axis of rotation eccentric to the axis of the cylindrical bore of the mold, &c., and with its periphery adapted to have forcible and rolling contact with the inner surface of the blank along the entire length thereof, so that in its movement of rotation upon its own axis and in its orbital movement around the axis of the other parts the said pressure-roller will embed the periphery of the duplicate record-blank 3 in the negative-matrix surface of the negative matrix 2, so that with a completion of the movement of said pressure-roller and the removal of such blank from the interior of the mold the periphery of such blank will have a positive impression of the negative matrix and be in a condition ready for use on a phonograph or like apparatus. Motion when required may be imparted to the said pressure-roller in a positive manner by any suitable carrying and driving mechanism which the judgment of the maker may suggest or the particular use of the present invention may indicate.

In the practical use of the present method any usual and suitable means, either physical or chemical, may be employed to soften the duplicate phonograph-blank 3 during the process of imparting a positive impression upon the same from the negative-matrix surface 2 and with a view to expedite the operation of the apparatus or when required in the formation of a more perfect positive impression upon the periphery of such duplicate record-blanks.

The present method is more especially adapted to the formation of duplicate records having very thin walls which render them readily collapsible, in that by partly collapsing the same they can after forming be readily and quickly removed from the interior of the mold without any liability to a marring or defacement of the positive record impressions upon their peripheries.

The apparatus herein described constitutes the subject-matter of a divisional application for Letters Patent filed by me April 20, 1906, Serial No. 312,763.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described method of forming thin-walled cylindrical phonograph-rec-

ords of a uniform diameter which comprises
the insertion of a cylindrical blank shell
within a suitable matrix, and the expansion
of such shell into such matrix along the en-
tire length of such shell and in the progress-
ive manner described.

2. The herein-described method of form-
ing thin-walled cylindrical phonograph-rec-
ords of a uniform diameter which comprises
the insertion of a cylindrical blank shell
within a suitable matrix, and the expansion

of such shell into such matrix along the en-
tire length of such shell and in the progress-
ive manner described, and in the presence of
a local softening influence.

Signed at Chicago, Illinois, this 6th day of
April, 1904.

VARIAN M. HARRIS.

Witnesses:

ROBERT BURNS,
M. H. HOLMES.

D. APSTEIN.
TALKING MACHINE.
APPLICATION FILED OCT. 14, 1904.

2 SHEETS—SHEET 1.

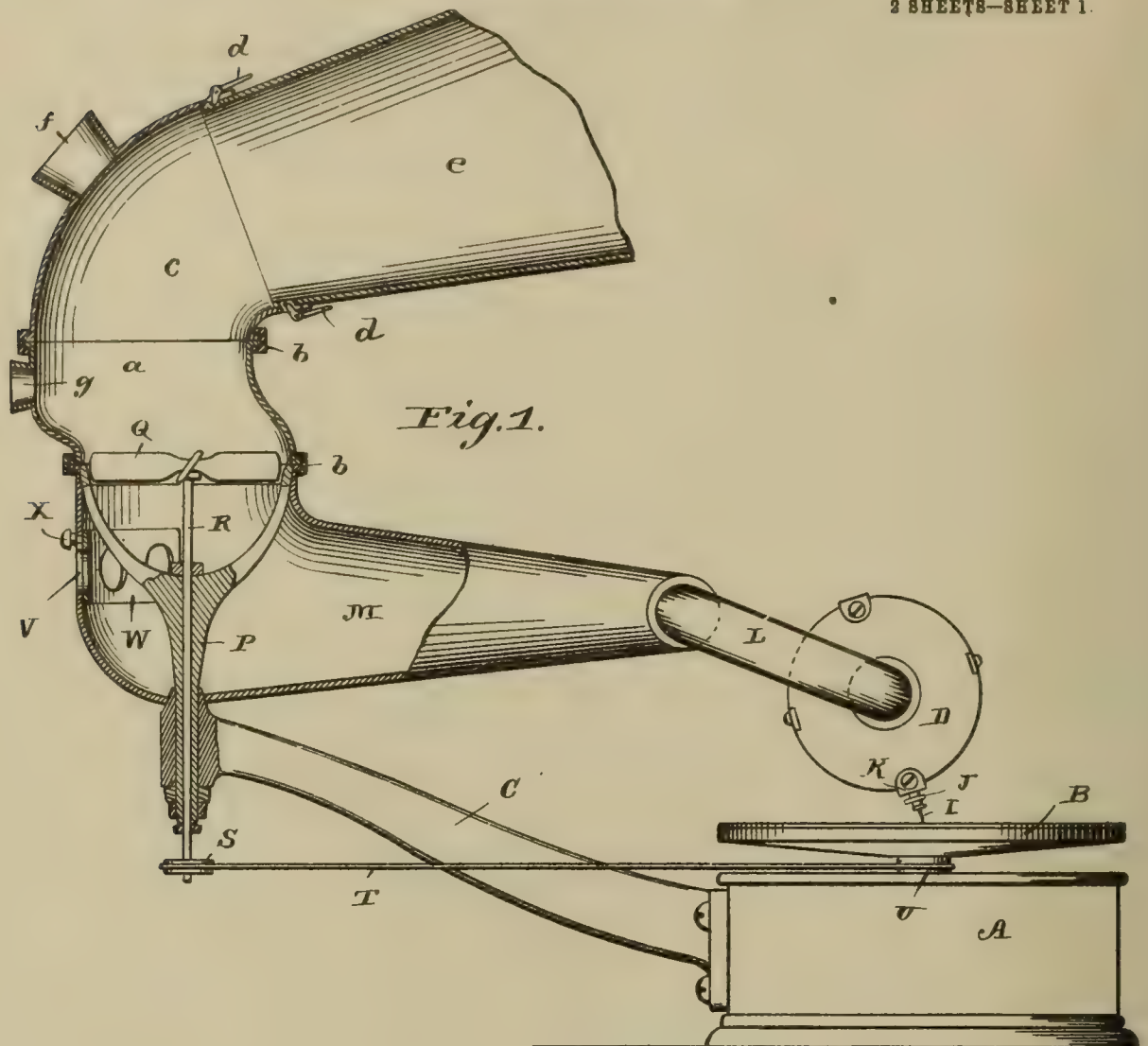


Fig. 2.

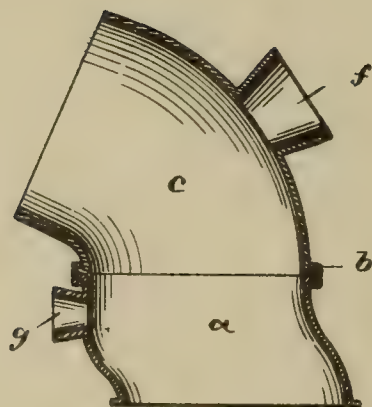
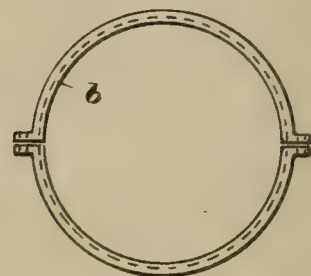


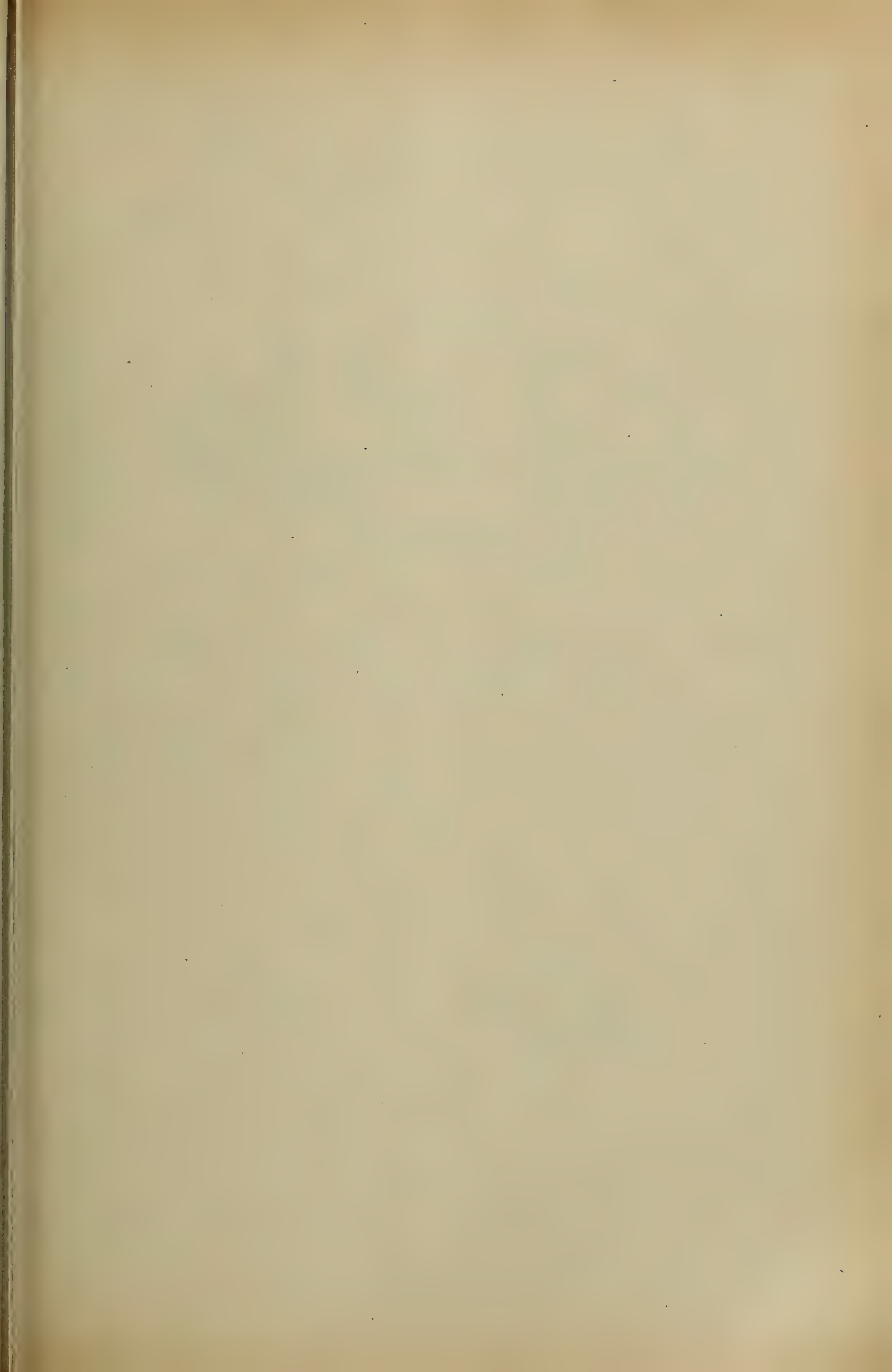
Fig. 3.



Witnesses

William P. Devitt
Jesse A. Stewart

Inventor
David Apstein
By Chamberlain & Newman
Attorneys



D. APSTEIN.
TALKING MACHINE.

APPLICATION FILED OCT. 14, 1904.

2 SHEETS—SHEET 2

Fig. 4.

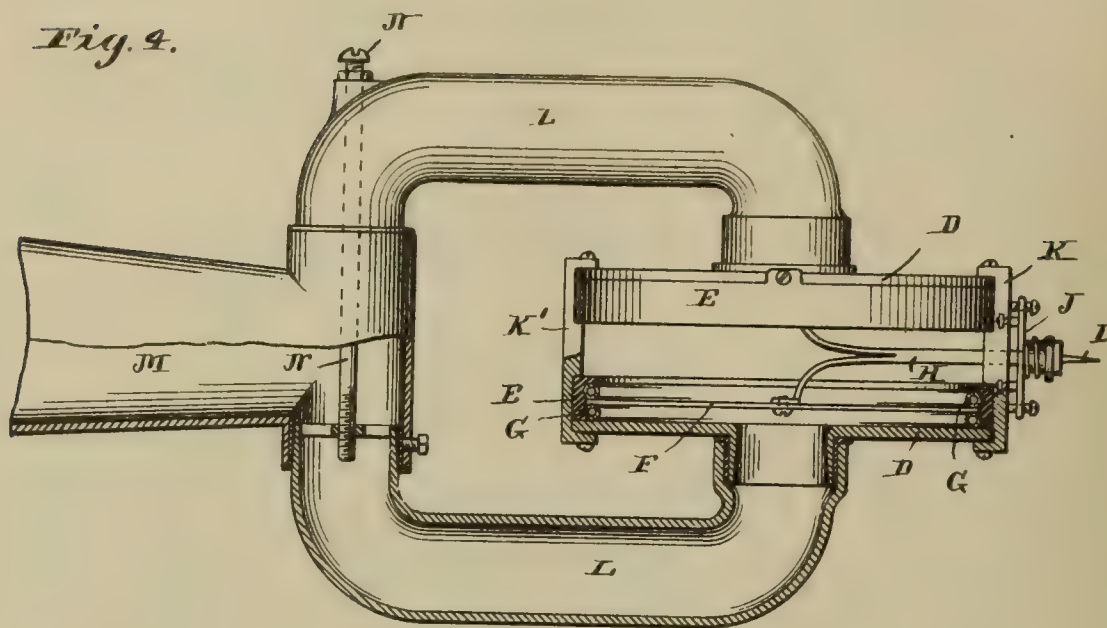


Fig. 5.



Fig. 6.

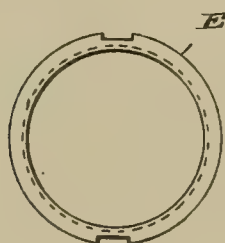


Fig. 7.



Fig. 8.

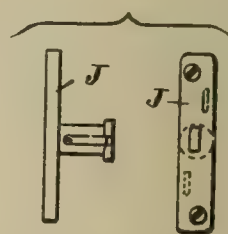


Fig. 9.

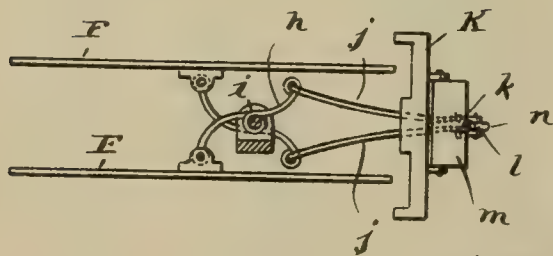


Fig. 10.

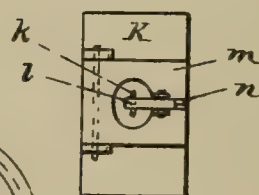
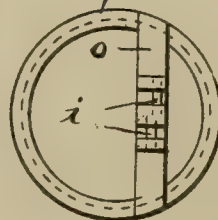


Fig. 11.



Witnesses
Jesse A. Stewart
William B. Devitt

Inventor
David Apstein
By Chamberlain & Newman
Attorneys

UNITED STATES PATENT OFFICE.

DAVID APSTEIN, OF BRIDGEPORT, CONNECTICUT.

TALKING-MACHINE.

No. 837,274.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed October 14, 1904. Serial No. 228,436.

To all whom it may concern:

Be it known that I, DAVID APSTEIN, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to new and useful improvements in talking-machines such as are used for reproducing and recording sound-waves.

It is the object of my invention to produce a talking-machine of improved construction which will include two or more sound-boxes connected with one or more horns, with a view of obtaining better results in recording and reproducing and whereby clearer and more distinct sounds may be produced; further, to provide means whereby these sounds may be better conveyed into or from the machine and likewise to provide adjustments whereby the sounds may be received from or deflected in any direction.

With the above objects in view I have devised the device which is shown in detail upon the accompanying two sheets of drawings forming a part of this specification, upon which similar characters of reference denote like or corresponding parts throughout the several figures, and of which—

Figure 1 shows a sectional side elevation of my improved talking-machine complete, a portion of the horn being broken away. Fig. 2 is a detail sectional view of the intermediate adjustable extension shown in the preceding figure. Fig. 3 is a detail plan view of a ring shown in the preceding figures and employed for uniting the several sections of the horn together. Fig. 4 is a sectional plan view of the transmitting mechanism, including double sound-boxes and connections therefor. Fig. 5 is a detail outside elevation of the end plate for the sound-boxes. Fig. 6 is a similar detail elevation of the peripheral casing of the sound-box. Fig. 7 is a detail side view of the bridge-plate which ties the two sound-boxes together and forms a support for the transcribing pin-holder. Fig. 8 shows an edge and side elevation, respectively, of the holder-plate for supporting the pin. Figs. 9 and 10 show a plan and end view, respectively, of a modified construction of sound-transmitting mechanism which I may use in lieu of that

shown in Fig. 4. Fig. 11 shows a detached plan view of one of the casings for the construction shown in Fig. 9 and illustrating a bridge across the side of said casing.

As will be seen from the drawings, my improved device is shown connected with a movement-box A, bearing a disk-support B and a bracket C. This support is obviously rotated in the usual way by a suitable driving mechanism contained within the box of any preferred construction. The disk likewise may be of the ordinary design, adapted to rotate horizontally with the pin to follow over the same in a vertically-inclined position.

In the carrying out of my invention I prefer to employ two sound-boxes, as is clearly shown in Fig. 4, each of substantially the same construction and bearing an inclosure or casing formed of an end piece D and a periphery E, in which is secured the usual transmitter F intermediate of annular rubber tubes G. An arm H, having a divided end to connect the diaphragms of the two boxes, communicates the sound to or from the pin I. This pin is held in a spring friction-socket of the holder J, which holder in turn is pivotally connected to the bridge K in a way to permit of the slight adjustment of the said holder and its pin with respect to the bridge. The bridge is rigidly connected to the two boxes, holding them at a proper distance apart, and is provided with lugs K'', against which the holder rests. By reason of the screws J' being located diagonally with respect to each other and with respect to the lugs a slight tilting movement may be imparted to the holder by simply tightening or loosening the screws, as occasion may require. On the opposite edge of the box is a second bridge K', which serves to hold the opposite edges of the boxes in a similar way.

Each sound-box is provided with a tube L flexibly attached thereto and both adjustably united with the T-shaped section of the horn M, said parts being provided with a screw N, by means of which the flexible joint may be tightened or loosened, as occasion may require, to secure the desired positioning of the horn with respect to the sound-box. The outer end of the T-shaped section M of the horn is preferably deflected upward and is supported on its under side by a bracket C. Interior of the horn is a supporting-spider P, which serves to stiffen its structure and like-

wise to provide a bearing for the blower Q. The shaft R of this blower is journaled in this spider, and a belt-pulley S is attached to its lower end and connected by a belt T with a similar pulley U upon the shaft of the record-holder. It will be seen that with this construction the blower is rotated by the movement of the holder, shaft, and disk in a way to create a "suction," so to speak, and to better convey the sounds in both recording and transcribing.

In the forward end of the horn I provide a series of holes V and a slide W, bearing a button X for its adjustment with respect to the holes in a manner to open and close the same. The purpose of this construction is to provide a more uniform distribution of the sounds as taken from the record and to allow the same or a portion of them to be deflected direct, as will be obviously apparent.

Upon the mouth of the horn-section M, I provide an intermediate section *a*, which is adjustably connected thereto by means of a two-part ring *b*, covering the edges of said horn and section in a way to permit said sections to be turned and adjusted thereon, so as to be extended to either side. Upon this intermediate section is also provided an elbow *c*, which is adjustably connected to an intermediate section by means of the ring *b* in a way to admit of its being turned to any position desired. To this elbow may be secured, by means of clamps *d*, a mouthpiece *e*, which obviously may be of any desired shape or length, and in addition to its application to the elbow I have also provided connections for similar mouthpieces to the other sections of the horn—as, for instance, at the nipple *f* in the elbow and likewise the nipple *g* of the intermediate section. This construction of sectional horn is adapted to be adjusted, as described, to deflect the sounds from the record uniformly and advantageously to the several corners of a room with improved results.

In Figs. 9 and 10 I have shown a modified form of transmitter to engage the record, which I have termed a "flexible connection" and which may be used in lieu of that shown in Fig. 4. This connection is formed largely of wire and in detail comprises the flexible arms *h*, pivotally supported upon pins *i* of a bridge *o*, secured to the ring E. These arms are connected by links *j* with a loop *k*, attached to the lever *l*. This lever is pivotally connected to a block *m*, which in turn is pivoted to the bridge-plate *k*. The free end of lever *n* serves to engage the record—communicating movement from the inner end through the loop *k* and flexible connections above described to the diaphragms F, which obviously

are secured in and form a part of the sound-boxes, as is clearly shown in Fig. 4.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a talking-machine, the combination with a sound-box, of a horn connected therewith, and means in the horn to cause a current of air to blow through said horn.

2. In a talking-machine, the combination with a sound-box, of a horn connected therewith, openings in the sides of said horn, a slide adapted to open and close said openings, and means to cause a current of air to blow through the horn to conduct the sounds.

3. In a talking-machine, the combination of a transmitting device comprising a double sound-box, an arm having divided ends to engage the diaphragm of the two boxes, a tube connection with each box, a single horn connection with the tubes and means to cause a current of air to blow through the horn.

4. In a talking-machine, the combination of a transmitting device comprising a double sound-box, an arm having divided ends to engage the diaphragm of the two boxes and connected with the pin-holder, a tube connection with each box, a single horn connection with the tubes, a blower within said horn and means for operating the same to deflect the sounds therefrom.

5. In a talking-machine, the combination with a double sound-box, of a horn with separate branches connected with each box, an extension adjustably secured to said horn adapted to deflect the sounds in different directions, and means to draw the sound-waves therethrough.

6. In a talking-machine, the combination with a double sound-box and connections therefor to engage a record, of a horn, an extension secured to said horn and deflected to one side, a second extension for said horn adapted to be deflected in a different direction each being adjustably connected to the other and each provided with an opening for the reception of one or more mouthpieces.

7. In a talking-machine, the combination with a sound-box bearing connections to engage a record, of a horn with branches intermediate the open end thereof and the box, openings in the horn, and a slide adapted to open and close said openings substantially as described.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 4th day of October, A. D. 1904.

DAVID APSTEIN.

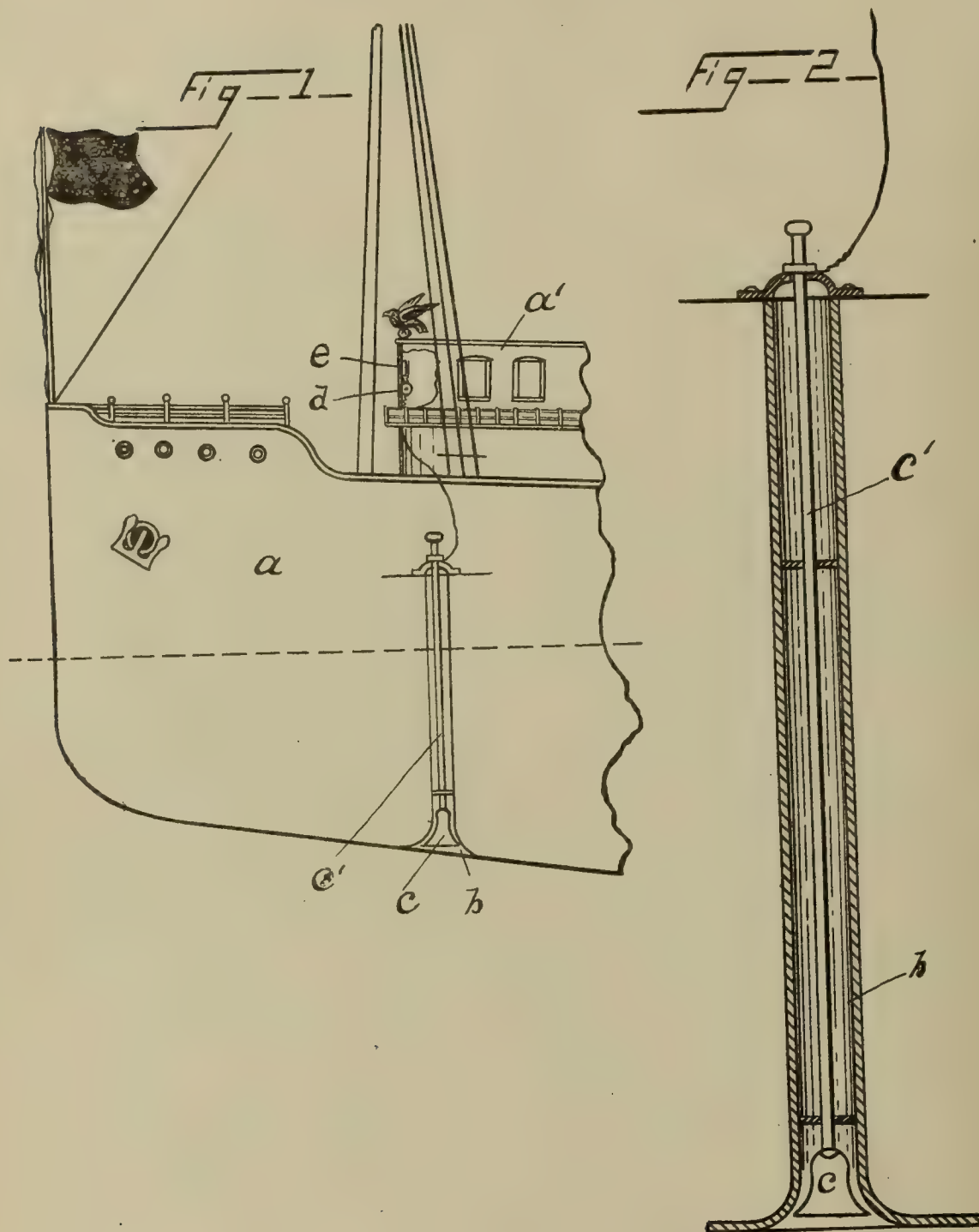
Witnesses:

C. M. NEWMAN,
RUTH RAYMOND.

No. 837,551.

PATENTED DEC. 4, 1906.

A. F. EELLS.
METHOD OF SEA SOUNDING.
APPLICATION FILED MAR. 20, 1906.



Witnesses
Frank C. Palmer.
Frank S. Dewire.

Inventor
Albert F. Eells

UNITED STATES PATENT OFFICE.

ALBERT F. EELLS, OF BOSTON, MASSACHUSETTS.

METHOD OF SEA-SOUNDING.

No. 837,551.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed March 20, 1906. Serial No. 307,132.

To all whom it may concern:

Be it known that I, ALBERT F. EELLS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Methods of Sea-Sounding, which improvement is fully described in the following specification, reference being had to the accompanying sheet of drawings.

This invention has for its object the production of a simple and effective method of automatically determining and indicating sea-soundings without the use of line, wire, or other tangible means of connecting a ship with the bottom of the sea.

Briefly described, my present invention consists in determining the distance between a ship's keel and the bottom of the sea either by utilizing the echo from a sound made on shipboard or by the return of an impulse due to the disturbance of the water at or near the surface of said water.

In the accompanying drawings, Figure 1 is a side elevation, chiefly in outline, indicating a portion of a ship having applied thereto an illustrative form of apparatus which may be used with my present invention; and Fig. 2 is a relatively enlarged sectional view of a tube extending, as here shown, from the main deck of the vessel to the bottom thereof, in which tube is located one element of said apparatus—to wit, a combined sounder and reverberator.

Referring to the drawings, the letter *a* indicates the bow portion of a vessel, and *a'* the pilot-house. Extending from the main deck downward through the ship to the bottom of said ship is a tube or well *b*, in the lower end of which is centrally located a bell *c*, said bell being so supported that it is free to vibrate and being, as here shown, attached to and supported by a metallic bar *c'*, that extends upward somewhat above the top of the well *b*, so that the free end of said bar may be struck a sharp blow, either by hand or by some automatic mechanical means, (not shown,) in order to cause the connected bell or other form of reverberator to give forth a sound below the surface of the water. This sound travels to the bottom of the sea and is echoed back and is then indicated by suitable means on shipboard or, if preferred, is received by telephonic means, the depth of water under the vessel being determined by

the time which elapses between the striking of the bell and the return of the echo.

The conditions governing the transmission of sound through water differ materially from those governing the transmission of sound through the free atmosphere, it being a well-known fact that while an echo may be noted by the ordinary ear at a distance as small as one hundred feet in free atmosphere an echo cannot be caught by the ordinary ear at a distance less than four hundred feet under water. This being true, it will be obvious that an echo could not be relied upon for the purpose of measuring depths less than four hundred feet unless some special provision be made, and this I have provided in the form of what may be regarded as a resistance-coil *d*, consisting, preferably, of a wire openly coiled, so that it is free to transmit the vibrations of the bell resulting from the reverberation or echo or other impulse, as the case may be.

The particular means for indicating the return of the sound or impulse is not material. It may be in the form of an indicator *e*, located within view of the pilot, or it may be in the form of a sensitive telephone-receiver. Neither is it material that the well shall be located inboard, as it would be equally effective if hung over the side of the vessel with its lower end submerged.

By the use of my described apparatus, and particularly if it includes means for striking the resonator or exerting an impulse at frequent intervals of time, the depth of water under the vessel is constantly being made known to the pilot, so that the grounding of vessels and the serious accidents and loss of life and property now constantly occurring could readily be avoided.

Having thus described my invention, I claim as new and wish to secure by Letters Patent—

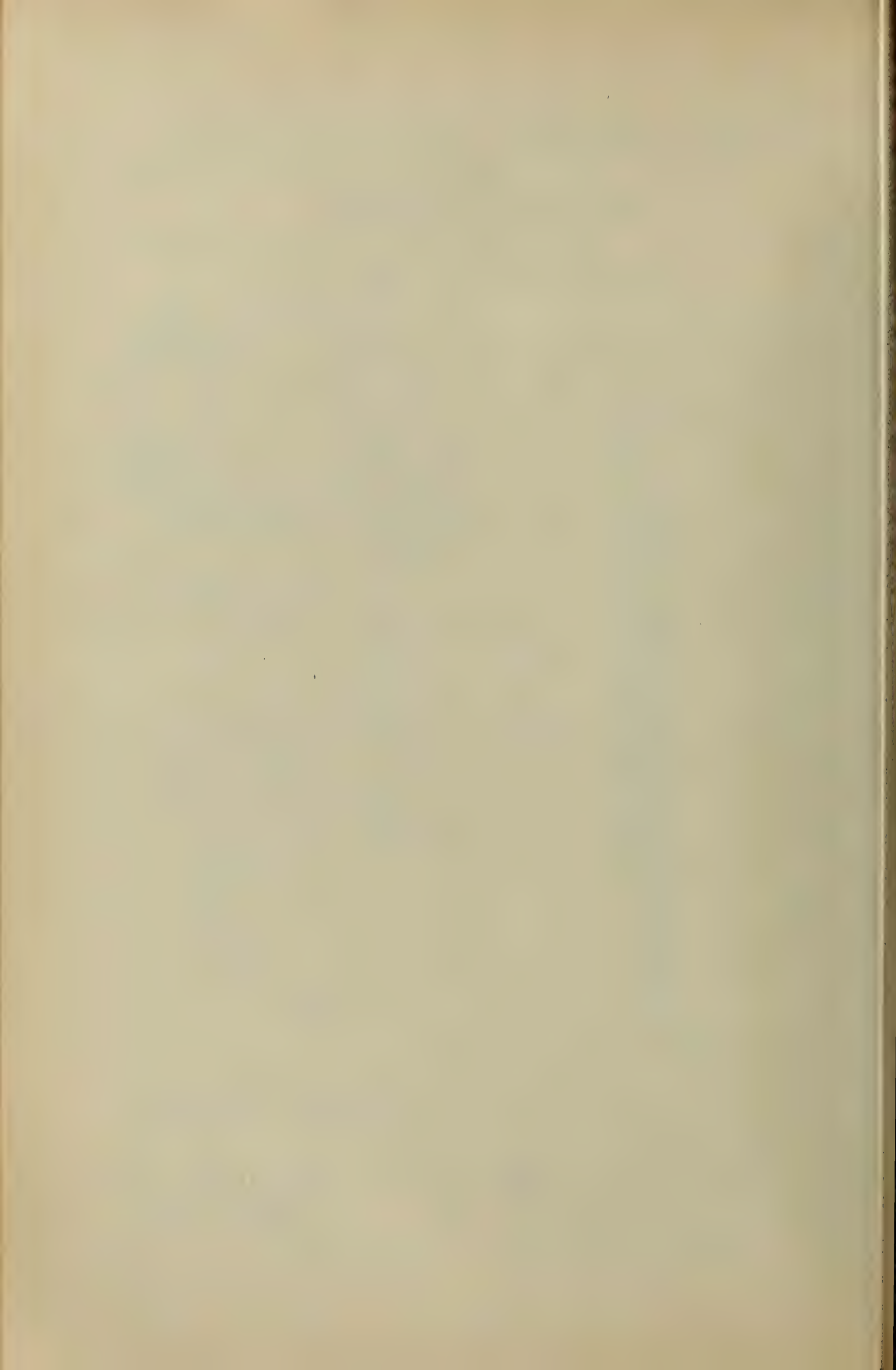
1. In the art of deep-sea sounding, the method of determining the depth of the water by utilizing the return of an impulse due to the disturbance of the water in proximity to its surface.

2. In the art of deep-sea sounding, the method of determining the depth of water by means of an echo and indicator.

ALBERT F. EELLS.

Witnesses:

FRANK H. ALLEN,
ALFRED MOFFITT.



No. 837,585.

PATENTED DEC. 4, 1906.

J. C. SCHLEICHER.
DAMPER FOR TALKING MACHINES.
APPLICATION FILED JAN. 6, 1906.

Fig. 1

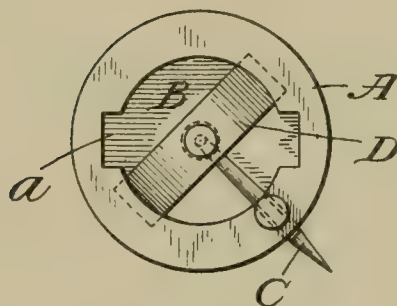


Fig. 2

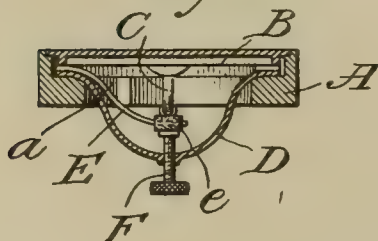


Fig. 3

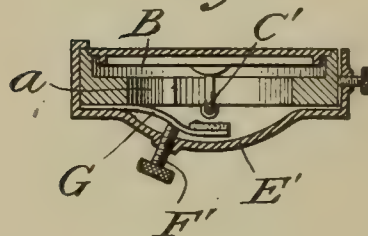


Fig. 4



Witnesses
Chas. J. Claggett
Chas. L. Wolf

Inventor
John C. Schleicher
By his Attorney
Charles A. Stephens

UNITED STATES PATENT OFFICE.

JOHN C. SCHLEICHER, OF MOUNT VERNON, NEW YORK.

DAMPER FOR TALKING-MACHINES.

No. 837,585.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed January 6, 1906. Serial No. 294,964.

To all whom it may concern:

Be it known that I, JOHN C. SCHLEICHER, a citizen of the United States, and a resident of Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Dampers for Talking-Machines, of which the following is a specification.

The subject of this invention is a reproducer-damper for talking-machines, and while disclosed herein as being associated with the type of machine wherein the record is in the form of a rotative horizontal disk said invention is also well adapted for machines using a cylinder-record.

It has been found in practice that the presence of dust or other foreign matter or abnormal irregularities on the record, particularly of the disk form, causes vibrations of the stylus-arm and the stylus mounted therein, which are magnified at the reproducing-diaphragm and produce harsh and discordant sounds. In addition it is desirable at times to modify and soften the sound thus reproduced.

My invention is designed to obviate the former defects in reproducers and also to equip the reproducer so that its tones and sounds shall be modified.

While the invention is disclosed in the accompanying drawings and set forth in the subsequent detailed description as being in the form of an attachment for reproducers, the improved device can be so embodied in connection with the reproducer as to constitute a permanent part thereof.

There are other important features connected with the invention, which, besides those alluded to, are clearly hereinafter explained.

In the accompanying drawings, forming part of this specification, Figure 1 is a side view showing a familiar form of reproducer embodying my invention. Fig. 2 is a somewhat similar view, the damper being applied. Fig. 3 is a sectional view disclosing a modification of Figs. 1 and 2. Fig. 4 is a detail view of a modification, showing the spring-arm provided with a pivoted dog.

Referring more particularly to Figs. 1 and 2, A represents the ring or sleeve of the sounding-box, B the diaphragm thereof, C the stylus, and C' the stylus-arm in which the stylus is mounted, all of which parts are of the ordinary well-known construction, and therefore need not be further described. Un-

der some conditions the stylus-arm and its stylus are violently vibrated, and it is therefore the purpose of this invention to provide means, embodying a damper and means for adjusting it, whereby the vibrations of the stylus-arm and its stylus can be regulated. In the form shown in Figs. 1 and 2 the damper is illustrated as being in the form of an arched leaf-spring D, the free ends of which are adapted to be inserted in the notches of the ring or shell A of the sounding-box, whereby a lateral turn engages the ends in position. This leaf-spring D carries a spring member or arm E, which may or may not have a cushion *e*. A bit of tubular rubber will suffice for the purpose. The bow of the leaf-spring admits of an adjusting-screw F being tapped therethrough, so as to bear on the free end of the spring member or arm and force it toward the stylus-arm to restrict its vibrations and the vibrations of its stylus.

In Fig. 3 I have illustrated the construction in which the bow leaf-spring E' is indicated and the spring-adjusting screw F' is represented at one side of the spring-arm G. The diaphragm point or needle is referred to by C'. It will be observed in this construction, that the free end of the spring E equipped with the same damper material previously alluded to.

In Fig. 4 I have shown a construction in which a spring-arm G', similar to the arm E, on the free end of which a dog H is pivotally mounted, so as to adapt it to be turned between the end of said spring-arm and the stylus-arm and forced toward said stylus-arm by screwing in the adjusting-screw to thereby dampen the sound, or turned out of the way, so that the end of the spring-arm will only be interposed between said parts and forced toward the stylus-arm by screwing in the adjusting-screw.

I do not wish to be understood as limiting myself to the precise construction and arrangement of parts shown, but reserve the right to all modifications within the scope of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A dampening device for talking-machines, embodying an arched bridge, a spring-arm one end being free and a dog pivoted on the free end of said spring-arm, substantially as described.

2. A dampening device for talking-ma-

chines, embodying an arched bridge, a spring-arm one end being free, a dog pivoted on the free end of said spring-arm and means carried by said arched bridge for forcing said spring-arm inwardly, substantially as described.

3. A dampening device for talking-machines, embodying a spring-arm one end adapted to be secured to the sounding-box thereof and the other end being free and a dog pivoted on the free end of said spring-arm, substantially as described.

4. A dampening device for talking-machines, embodying a spring-arm one end adapted to be secured to the sounding-box thereof and the other end being free, a dog pivoted on the free end of said spring-arm, and means for forcing said spring-arm inwardly, substantially as described.

5. In a reproducer for talking-machines, the combination of the sounding-box and a dampening device embodying an arched bridge mounted on said sounding-box, a spring-arm mounted on said sounding-box one end being free and projecting over the stylus-arm, and a dog pivoted on the free end of said spring-arm, substantially as described.

6. In a reproducer for talking-machines, the combination of the sounding-box and a dampening device embodying an arched bridge mounted on said sounding-box, a spring-arm mounted on said sounding-box one end being free and projecting over the stylus-arm, a dog pivoted on the free end of said spring-arm, and means for forcing said spring-arm toward said stylus-arm, substantially as described.

7. In a reproducer for talking-machines, the combination of the sounding-box having notches and a dampening device embodying an arched bridge the ends adapted to be inserted into said notches and turned to engage said sounding-box to removably secure it thereon, a spring-arm removably secured on said sounding-box one end being free and projecting over the stylus-arm and means adjustably mounted in said arched bridge for forcing said spring toward the stylus-arm, substantially as described.

8. In a reproducer for talking-machines, the combination of the sounding-box having notches and a dampening device embodying an arched spring-bridge the ends adapted to

be inserted into said notches and turned to engage said sounding-box to removably secure it thereon, a spring-arm removably secured on said sounding-box one end being free and projecting over the stylus-arm and means adjustably mounted in said arched spring-bridge for forcing said spring toward the stylus-arm, substantially as described.

9. In a reproducer for talking-machines, the combination of the sounding-box having a notched flange and a dampening device embodying an arched bridge the ends adapted to be inserted into the notches in the flange of the sounding-box and turned to engage said flange to secure it, a spring-arm one end secured to the sounding-box and the free end projecting over the stylus-arm and a screw adjustably mounted in said bridge and adapted to force said spring-arm toward said stylus-arm, substantially as described.

10. In a reproducer for talking-machines, the combination of the sounding-box having a notched flange and a dampening device embodying an arched bridge the ends adapted to be inserted into the notches in the flange of the sounding-box and turned to engage said flange to secure it, a spring-arm one end secured to the sounding-box and the free end projecting over the stylus-arm a piece of dampening material on the free end of said spring-arm, and means for forcing said spring-arm toward said stylus-arm, substantially as described.

11. In a reproducer for talking-machines, the combination of the sounding-box having a notched flange and a dampening device embodying an arched bridge the ends adapted to be inserted into the notches in the flange of the sounding-box and turned to engage said flange to secure it, a spring-arm one end secured to the sounding-box and the free end projecting over the stylus-arm, a piece of dampening material pivoted on the free end of said spring-arm, and means for forcing said spring-arm toward said stylus-arm, substantially as described.

Signed at New York, in the county of New York and State of New York, this 29th day of December, A. D. 1905.

JOHN C. SCHLEICHER.

Witnesses:

A. B. BLACKWOOD,
CHAS. L. WOLF.

No. 837,927.

PATENTED DEC. 11, 1906.

V. M. HARRIS.
PHONOGRAPH RECORD.
APPLICATION FILED APR. 11, 1904.

Fig. 1.

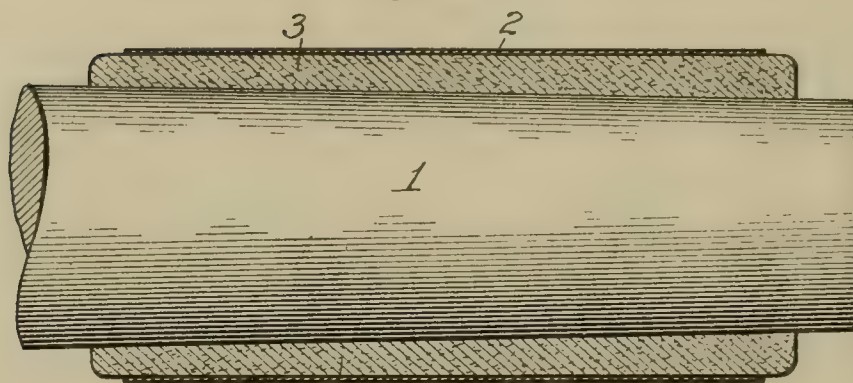


Fig. 2.

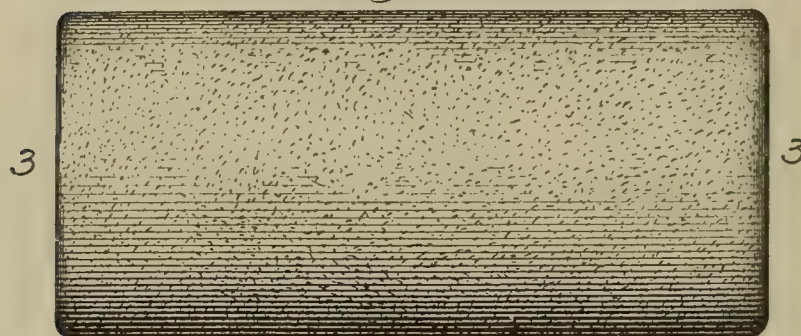


Fig. 3.

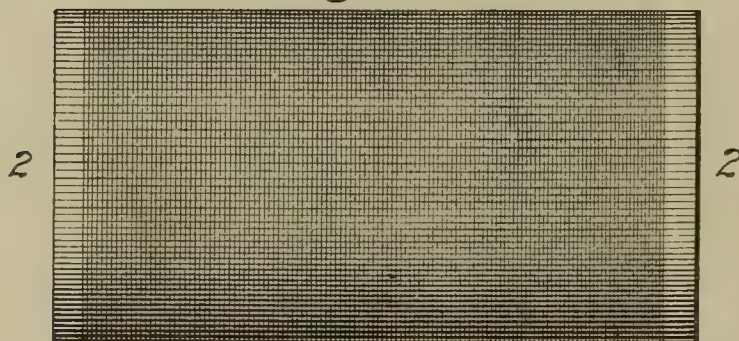
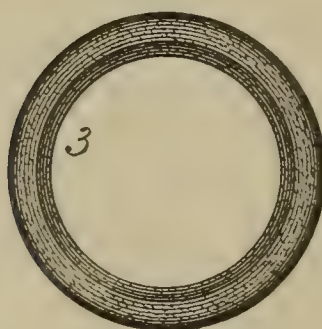


Fig. 4.



Attest:

John Enders.

M. H. Holmes.

Inventor
Varian M. Harris.

by

Robert Burns

Attorney.

UNITED STATES PATENT OFFICE.

VARIAN M. HARRIS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH TO
ROBERT BURNS, OF CHICAGO, ILLINOIS.

PHONOGRAPH-RECORD.

No. 837,927.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed April 11, 1904. Serial No. 202,514.

To all whom it may concern:

Be it known that I, VARIAN M. HARRIS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph-Records, of which the following is a specification.

The present invention relates to that type of permanent cylindrical phonograph-records in which a thin cylindrical record-film is carried upon a cylindrical carrying-mandrel that is adapted to have engagement with the ordinary tapering spindle or mandrel of a phonograph; and the object of the present improvement is to provide a simple and efficient structural formation and combination of parts in which a cylindrical record-film of a tough and durable material and having such tenuity that in itself it will have no sound reproduction if unsupported is supported upon an intermediate carrying-mandrel of a nature that will efficiently support such record-film and which at the same time will materially aid in a faithful reproduction of the true and natural tones without any of the harsh and metallic qualities usual to the older type of permanent phonograph-records, all as will hereinafter more fully appear, and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present invention, Figure 1 is a detail longitudinal sectional elevation illustrating the present improvement applied to the tapering carrying spindle or mandrel of a phonograph. Fig. 2 is a side elevation of the submandrel of the present invention. Fig. 3 is a side elevation of the permanent cylindrical record-film. Fig. 4 is an end elevation of the submandrel aforesaid.

Similar numerals of reference indicate like parts in the several views.

In the present type of permanent phonograph-records as heretofore proposed the permanent cylindrical record-film of celluloid or like tough and enduring material was carried by a submandrel of sheet metal, wood, or other hard material, and as so formed and arranged imparted to the sound reproduction harsh and grating qualities which greatly impaired the practical value and usefulness of such records.

With a view to the avoidance of the above-stated defects the present invention consists in the formation of the submandrel aforesaid of a material having a density closely approximating that of an ordinary wax phonograph-record, as extended practical experiment has shown that a cylindrical record-film of celluloid or the like supported on a submandrel of a density closely approximating that of an ordinary wax record will reproduce faithfully the true and natural tones without any harsh or metallic qualities and equal in all particulars to the reproductions from an ordinary wax record and be at the same time practically indestructible.

Referring to the drawings, 1 represents a portion of the tapering spindle or mandrel of a phonograph.

2 is a cylindrical record-film of celluloid or like tough and durable material and of such tenuity that when unsupported it will have no sound reproduction in itself, and in consequence of which the film when mounted as hereinafter set forth will not have substance enough in itself to impart the harsh and grating tone to the reproduction which an ordinary thick shell of celluloid or other like hard and durable material would. Other advantageous features of such attenuated film are that a more accurate and perfect record can be molded upon the surface thereof than could be effected upon the ordinary thick celluloid records heretofore found on the market. Economy of manufacture also results owing to the small quantity of high-grade celluloid required for each record.

3 is the submandrel, having the usual tapering bore adapted to fit the phonograph spindle or mandrel 1, and a cylindrical periphery upon which the cylindrical record-film 2 is shrunk or otherwise secured in any usual and suitable manner. In the present improvement such submandrel 3 is formed of wood-pulp or other allied fibrous or like bodies molded into the required shape and brought to a density closely approximating that of the wax employed in the manufacture of ordinary wax phonograph-records either by pressure alone or by the saturation of such pulp-body with a wax or resin and the compression of the saturated pulp to the required density.

Having thus fully described my said inven-

tion, what I claim as new, and desire to secure by Letters Patent, is—

1. A phonograph-record comprising a permanent cylindrical record-film of celluloid-like material, so thin as to be of itself incapable of sound reproduction, and a support upon which said film is mounted, the said support being formed of a plastic material rigid enough to support said film and having a density closely approximating that of the wax employed in the manufacture of wax records.

2. A phonograph-record comprising a permanent cylindrical record-film of celluloid-like material, so thin as to be of itself incapable of sound reproduction, and a support upon which said film is mounted, the said support being formed of wood-pulp and a

plastic material and having a density closely approximating that of the wax employed in the manufacture of wax records.

3. A phonograph-record comprising a permanent cylindrical record-film of celluloid-like material so thin as to be of itself incapable of sound reproduction, and a support upon which said film is mounted, the said support being formed of wood-pulp saturated with a wax-like material and having a density closely approximating that of the wax employed in the manufacture of wax records.

Signed at Chicago, Illinois, this 6th day of April, 1904.

VARIAN M. HARRIS.

Witnesses:

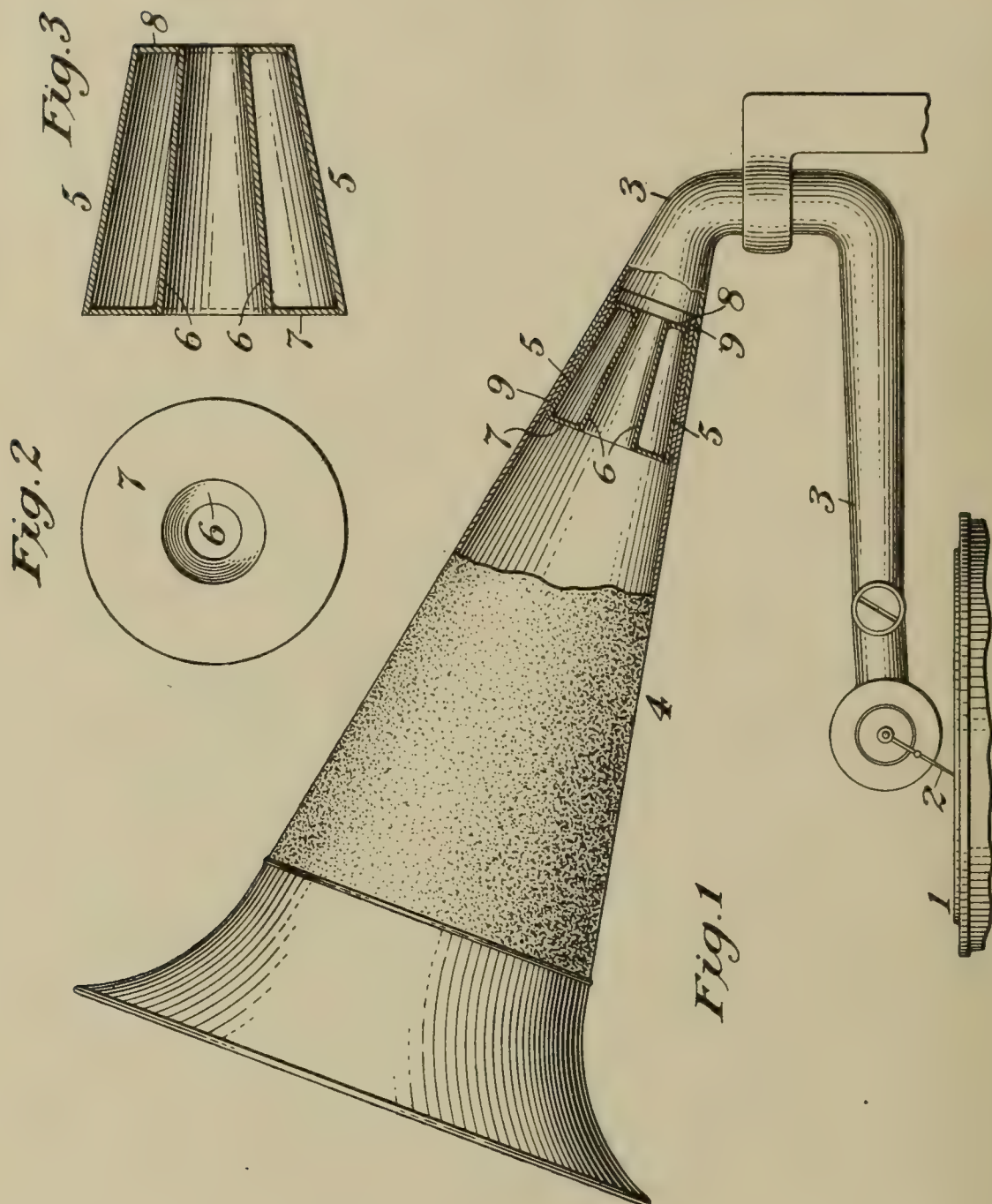
ROBERT BURNS,
M. H. HOLMES.

No. 838,297.

PATENTED DEC. 11, 1906.

C. R. BREEN.
SOUND MODIFIER.

APPLICATION FILED MAY 25, 1906.



Witnesses:

Bernard Cowen
Henry Barnes

Inventor:

Charles R. Breen
by Henry D. Williams
Atty.

UNITED STATES PATENT OFFICE.

CHARLES R. BREEN, OF NEW YORK, N. Y.

SOUND-MODIFIER.

No. 838,297.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed May 25, 1906, Serial No. 318,628.

To all whom it may concern:

Be it known that I, CHARLES R. BREEN, a citizen of the United States, residing in the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Modifiers, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

In the use of talking-machines, phonographs, graphophones, and other sound-emitting apparatus it is frequently desirable to modify or soften the sound emitted at the horn, as when the user employs the apparatus for his own sole amusement or when for any reason the full tone of the instrument is not desired.

My invention has for its object to provide such a sound-modifying attachment of improved and simple construction and adaptable for ready insertion in the horn and removal therefrom.

My invention also has for its objects the attainment of sound-resonating effects in the sound-modifier, whereby a pleasing quality of modulated sound is produced.

I will now describe the device embodying my invention illustrated in the accompanying drawings, and will thereafter point out my invention in claims.

Figure 1 is an elevation, partly in section, of a horn with the sound-modifier therein and of the upper part of the talking-machine. Fig. 2 is a front elevation of the sound-modifier. Fig. 3 is a central longitudinal section of the same.

The drawings illustrate parts of an ordinary talking-machine, including a disk or record 1, a needle 2, a sound-conveying arm 3, and a horn 4. The horn has a projecting thimble 9 at its small end secured thereto or forming part thereof and fitting into the end of the sound-conveying arm 3.

My improved sound-modifier is shown in Fig. 1 in its operative position in the horn and is separately shown in Figs. 2 and 3. It comprises a hollow box having an outer frusto-conical wall 5, which fits the inner surface of the horn or the thimble 9 thereof near the small end of the horn, and having an inner frusto-conical wall 6 inclosing a restricted aperture extending from end to end of the box, these two frusto-conical walls having a common axis coincident with the axis of the

horn. This hollow box also has a front annular end wall 7 and a rear annular end wall 8, these annular end walls being arranged right angularly to the common axis of the frusto-conical walls. The four walls of the box constituting the sound-modifier are shown as made of separate pieces secured together, as by glue applied at their abutting portions. The material employed is preferably a fibrous hard material—such, for example, as a heavy paper or cardboard known as “pressed board.”

The sound-modifier fits tightly into the horn and restricts the opening or passage therethrough to the aperture through the sound-modifier and also provides a sound-dampening chamber surrounding this restricted orifice, so that it not only reduces the volume of the sound emitted by the horn but modifies and softens its quality, producing a pleasing modulation of the tone of the instrument. The sound-modifier may be readily inserted and removed, so that the instrument may be quickly changed from the condition of loudest tones to the condition in which its softened and modified tones are emitted.

It is obvious that modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a sound-emitting horn, of a sound-modifier adapted to fit therein and provided with an opening therethrough and with walls inclosing a hollow sound-dampening chamber.

2. The combination, with a sound-emitting horn, of a sound-modifier adapted to fit therein and comprising an outer frusto-conical wall, an inner frusto-conical wall forming an opening extending through the sound-modifier, the two frusto-conical walls having a common axis, and annular end walls arranged right-angularly to such axis and inclosing a chamber between the frusto-conical walls, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES R. BREEN.

Witnesses:

HENRY D. WILLIAMS,
BERNARD COWEN.

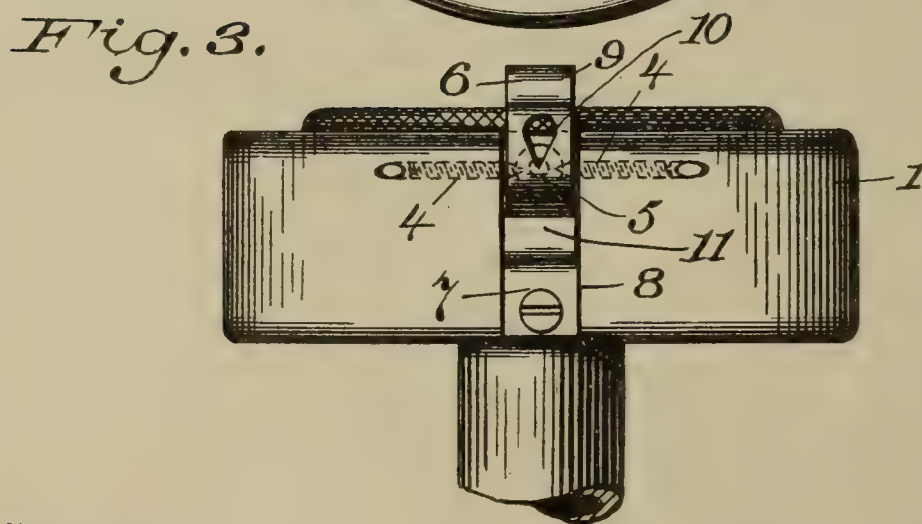
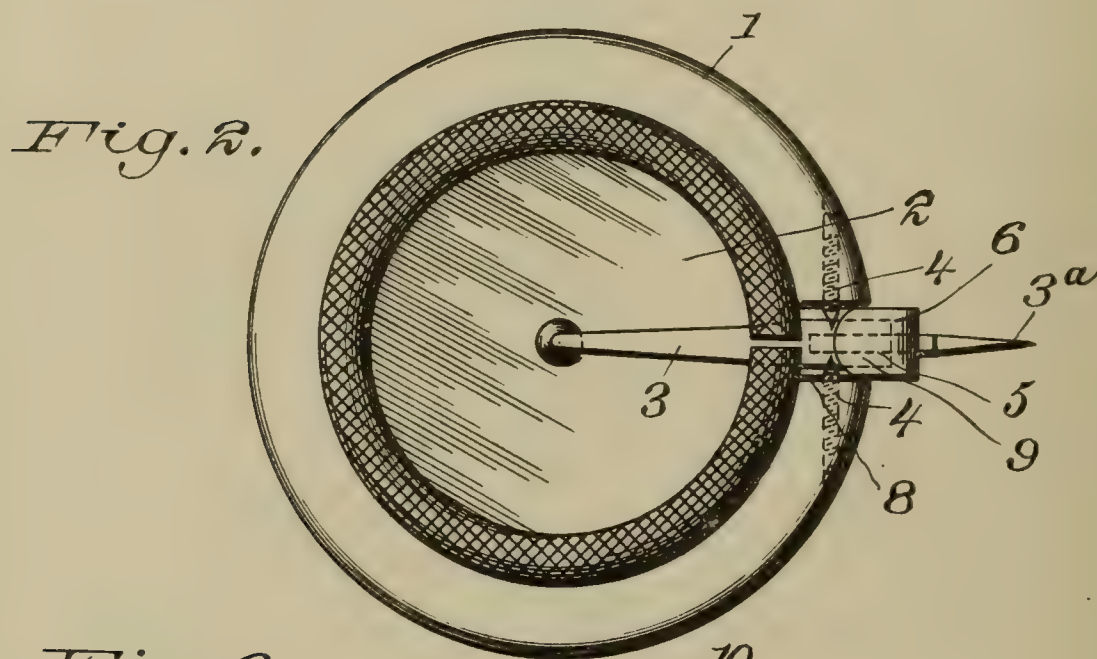
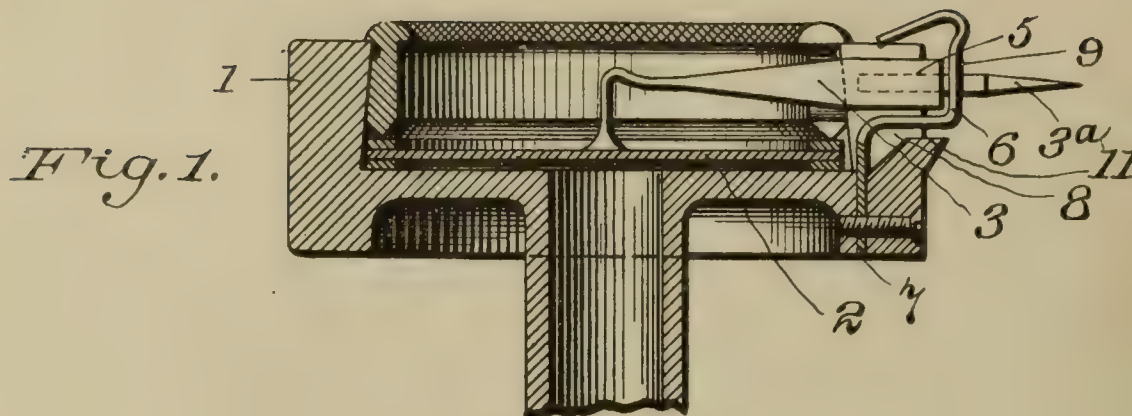


No. 838,326.

PATENTED DEC. 11, 1906.

A. HAUG.
SOUND REPRODUCER.

APPLICATION FILED AUG. 3, 1905.



Witnesses
Frank Connor
C. Barnett

Inventor
Andrew Haug
By his Attorney W. H. Humphrey

UNITED STATES PATENT OFFICE.

ANDREW HAUG, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

SOUND-REPRODUCER.

No. 838,326.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed August 3, 1905. Serial No. 272,450.

To all whom it may concern:

Be it known that I, ANDREW HAUG, residing at 1965 Madison avenue, borough of Manhattan, city, county, and State of New York, have invented certain Improvements in Sound-Reproducers, of which the following is a specification.

My invention relates to sound recording and reproducing apparatus in general, and as herein embodied is designed for use in connection with sound-reproducers of the type employing a detachable needle or stylus.

The object of my invention is primarily to produce a device which will operate automatically or semi-automatically to detachably secure the needle or stylus in locked relation with the stylus-arm, and thereby dispense with the old form of set-screw heretofore employed for this purpose.

A further object of the invention is to cause such a device to perform a double function, the first being to secure the stylus in position, as above stated, and the second to coact with the stylus-arm and maintain it in operative relation to the diaphragm under the required tension.

A device suitable for carrying my invention into effect is illustrated in the accompanying drawings. I do not wish to be understood, however, as limiting myself to either the exact construction or arrangement shown, as various changes may be made therein without departing from the spirit and scope of my invention.

In the drawings, Figure 1 is a central section of a sound-reproducer, showing my invention applied thereto. Fig. 2 is a top view; and Fig. 3 is a side elevation thereof.

Referring now to the drawings, 1 represents the casing of the reproducer or "sound-box," as it is generally known, 2 the diaphragm mounted therein, and 3 the stylus-arm, which is pivoted at 4 or otherwise operatively arranged with the inner end thereof connected to the diaphragm. The stylus-arm is socketed at its free end in the usual manner, as indicated at 5, to receive a needle 3^a, which is detachably held therein by a spring 6.

The form and arrangement of the spring may be varied in accordance with the requirements of the particular type of reproducer with which it is used. Preferably a

plate-spring is employed having one end 7 thereof secured in a recess 8 of the casing and the opposite end 9 bent up to extend across and slightly in advance of the socketed end of the stylus-arm. Formed in the spring at a point slightly out of line with the socket of the stylus-arm there is an aperture 10, which is elongated or given a V form, as shown.

When a needle is to be inserted, slight pressure of the finger upon the spring serves to bring the aperture 10 thereof into alignment with the socket of the stylus-arm, permitting the needle to be passed through the aperture and enter the socket in the usual manner. As the spring is released it tends to return to normal position; but its movement is checked by the needle, which becomes firmly gripped under the pressure of the spring in the small end of the V-opening thereof. The removal of the needle is readily effected, as will be apparent, by depressing the spring until the V portion of the aperture clears the same, and thereupon the needle falls out of the socket of the stylus-arm by its own weight.

In addition to its function of locking the needle in position the spring also acts through the same to exert sufficient pressure upon the stylus-arm to maintain its inner end in operative relation to the diaphragm under the required tension.

The free end of the spring is preferably bent over, as shown, to serve as a finger-rest for convenience in depressing the same as required to insert or release a needle. The movement of the spring is limited by a suitable stop 11, which prevents its being bent out of shape or broken.

The extreme simplicity and effectiveness of the device, as well as its many important advantages, will be at once apparent.

Having thus described my invention, I claim—

1. A sound-reproducer comprising a casing, a diaphragm therein, a pivoted stylus-arm, a spring normally ineffective, and a stylus through which the spring acts to maintain the arm in operative relation to the diaphragm.

2. A sound-reproducer comprising a casing, a diaphragm therein, a stylus-arm socketed at one end, a spring arranged exteriorly

of the socket and acting in a line at right angles thereto, and a stylus movable in and out of the socket in opposition to the spring.

5 3. A sound-reproducer comprising a casing, a diaphragm therein, a stylus-arm socketed at one end, a spring arranged exteriorly of the socket and extending across the open end thereof, and a stylus movable in and out of the socket in opposition to the spring.

10 4. A sound-reproducer comprising a casing, a diaphragm therein, a socketed stylus-arm, a spring provided with an opening eccentrically disposed to the open end of the socket, and a stylus movable in and out of the socket in opposition to the spring.

15 5. A sound-reproducer comprising a casing, a diaphragm therein, a socketed stylus-arm, an apertured spring, said arm and spring being relatively arranged normally with the socket and aperture thereof out of alinement, and a stylus movable in and out of the socket in opposition to the spring.

20 6. A sound-reproducer comprising a casing, a diaphragm therein, a socketed stylus-arm, a spring arranged exteriorly to the

socket and controlling entrance to the same, and a stylus movable in and out of the socket in opposition to the spring.

7. A sound-reproducer comprising a casing, a diaphragm therein, a socketed stylus-arm, a spring having an approximately V-shaped opening therein, said opening being normally out of alinement with the socket in the arm, a stop for limiting movement of the spring, and a stylus adapted to enter the socket through the opening in the spring.

8. A sound-reproducer comprising a casing, a diaphragm therein, a socketed stylus-arm, a spring having an approximately V-shaped opening therein, the smaller end of the opening registering normally with the open end of the socket in the arm, and a stylus adapted to enter the socket and interlock with the opening in the spring.

In testimony whereof I affix my signature in the presence of two witnesses.

ANDREW HAUG.

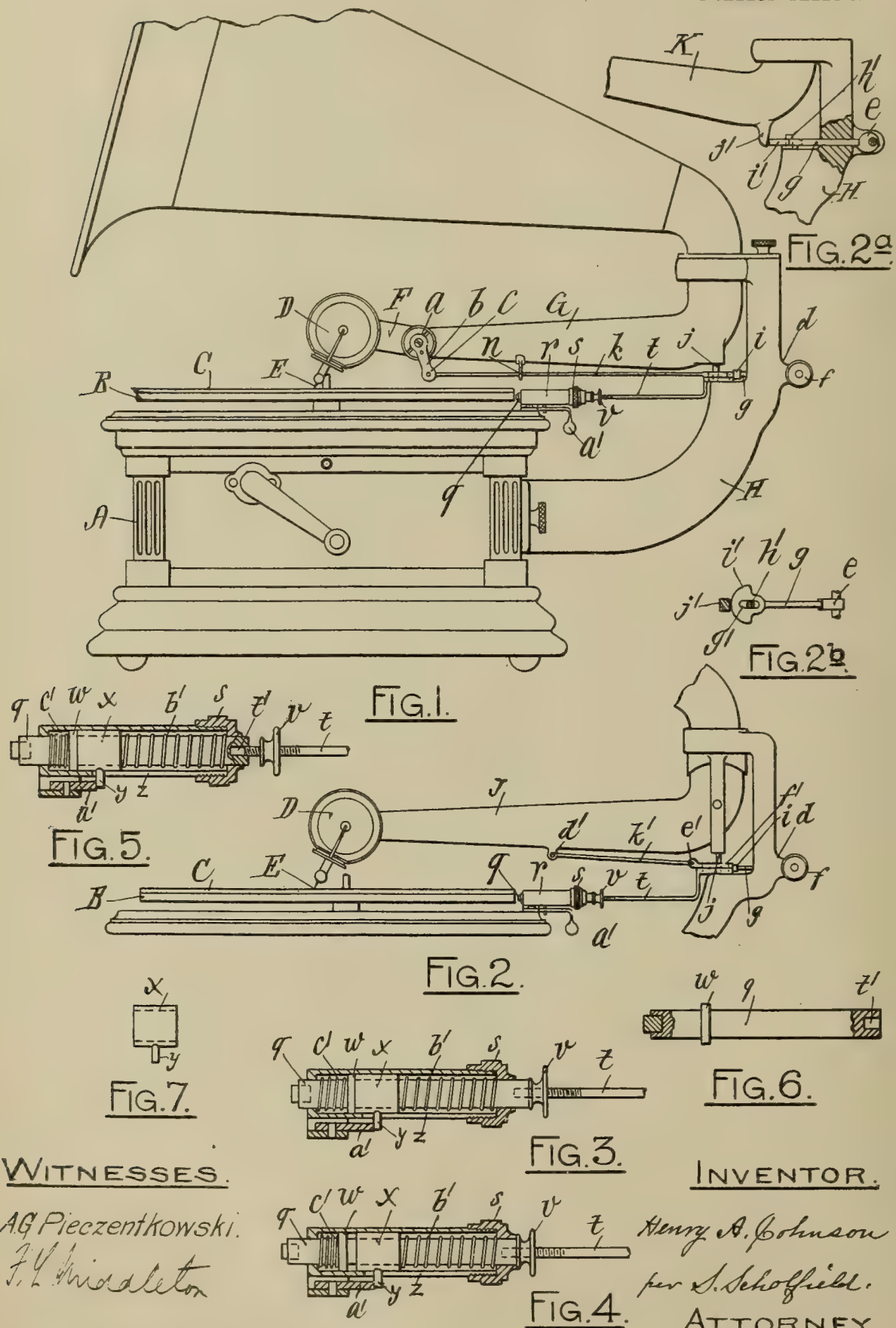
Witnesses:

W. H. PUMPHREY,
M. G. CRAWFORD.



H. A. JOHNSON.
TALKING MACHINE.
APPLICATION FILED MAY 7, 1908.

2 SHEETS—SHEET 1.



WITNESSES.

AG Pieczentkowski.

J. L. Middleton

INVENTOR.

Henry A. Johnson

per S. Scholfield.

ATTORNEY.

H. A. JOHNSON.
TALKING MACHINE.
APPLICATION FILED MAY 7, 1906.

2 SHEETS—SHEET 2.

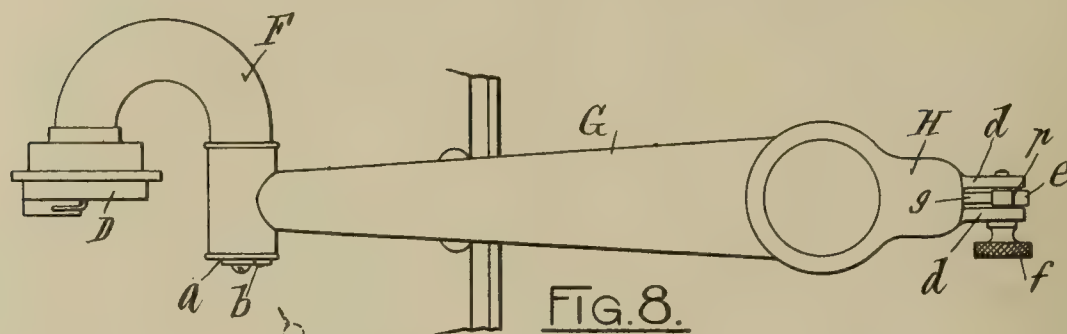


FIG. 8.

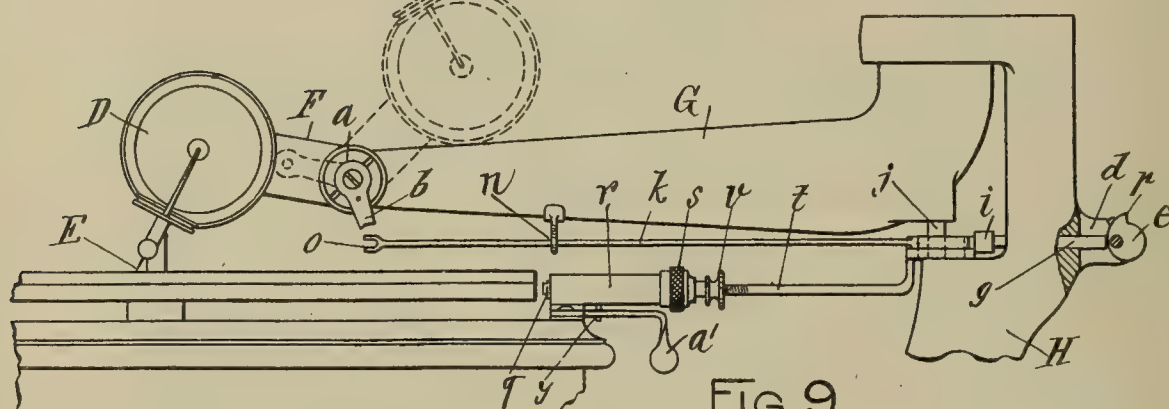


FIG. 9.



FIG. 14.

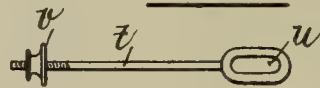


FIG. 15.

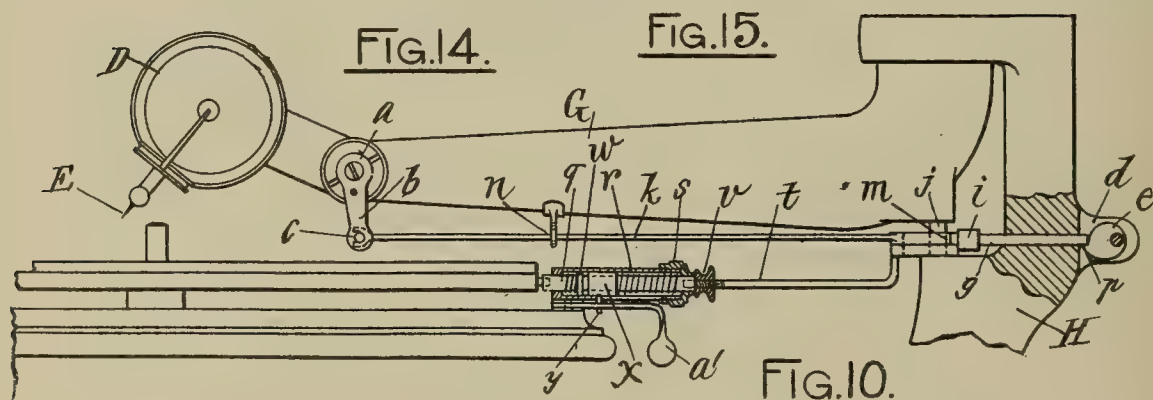


FIG. 10.

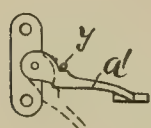


FIG. 13.

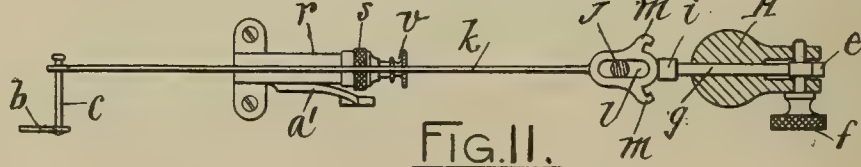


FIG. 11.

WITNESSES.

A. G. Pieczentkowski.

F. H. Middleton

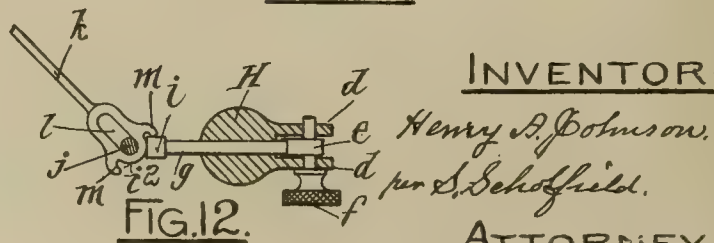


FIG. 12.

INVENTOR:

Henry A. Johnson.

per S. Schofield.

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY A. JOHNSON, OF PROVIDENCE, RHODE ISLAND.

TALKING-MACHINE.

No. 838,505.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed May 7, 1906. Serial No. 315,701.

To all whom it may concern:

Be it known that I, HENRY A. JOHNSON, a citizen of the United States, residing at Providence, in the State of Rhode Island, have invented a new and useful Improvement in Talking-Machines, of which the following is a specification.

My invention relates to an attachment which is adapted for use in that class of talking-machines in which the arm which carries the sounding-box and the stylus is adapted both for elevation and swinging movement; and it consists in an improved mechanism for raising the stylus from the record-plate and for simultaneously applying the brake to the record-supporting table.

It also consists in the improved construction of the brake, which serves to prevent the rotation of the table.

In the accompanying drawings, Figure 1 represents a side elevation of a talking-machine provided with my improvement. Fig. 2 represents a detail side view showing a modification whereby the improvement is adapted to another style of machine. Fig. 2^a represents a detail side view showing another modification. Fig. 2^b represents a top view of the circularly-curved elevating means. Fig. 3 represents an enlarged axial section of the brake when the brake is in its disengaged position. Fig. 4 represents the same section when the brake is in engagement. Fig. 5 also represents the same section when the brake is in engagement. Fig. 6 represents a side view of the sliding bar of the brake. Fig. 7 represents a side view of the loose sleeve which is held upon the sliding bar of the brake. Fig. 8 represents an enlarged top view of the swinging arm which carries the swivel-jointed arm of the sounding-box and the stylus. Fig. 9 represents a side view of the same, showing the stylus in engagement with the record-plate and with the brake removed from its action upon the rotary table. Fig. 10 represents the same side view, showing the stylus raised from the record-plate and the brake in action upon the edge of the table, the brake mechanism being shown in section. Figs. 11 and 12 are detail views of the mechanism for raising the stylus from the record-plate. Fig. 13 represents a top view of the cam-lever employed for holding back the brake. Fig. 14 represents an

inner end view of the brake. Fig. 15 represents a top view of the connecting-rod by means of which the brake is operated.

In the drawings, Fig. 1, A represents the base, which contains the motor by means of which the horizontal table B is rotated, and upon the table B is placed the record-plate C. The sounding-box D and stylus E are carried by the curved arm F, which is swivel-jointed to the outer end of the arm G, which latter arm is swivel-jointed to the fixed arm H. To the swivel end *a* of the arm F is secured the downwardly-extending arm *b*, the end of which is provided with the crank-pin *c*. Between the ears *d d* at the rear of the fixed arm H is placed the cam *e*, which is operated by means of the knurled head *f*, the said cam being arranged to act against the end of the sliding bar *g*. Upon the pivot-stem *j*, upon which the arm G turns, is placed the rod *k*, provided with the slot *l*, which embraces the said pivot-stem *j* and is provided with the hooks *m m*, which when the said rod *k* is turned to one side, as shown in Fig. 12, engage with the head *i* of the sliding bar *g*, and thus prevents the further lateral movement of the arm G, to which the rod *k* is attached. The forward position of the sliding bar *g* and the rod *k* is shown in Figs. 10 and 12, and the backward position in Figs. 9 and 11. The rod *k* is guided in the eye *n*, located at the under side of the arm G, and is provided at its forward end with the open fork *o*, which is adapted to engage with the crank-pin *c* of the arm *b*, which serves to raise the arm F. The stylus E is to be raised to the position shown in Fig. 10 by turning the cam *e* until the projection *p* of the said arm strikes against the end of the sliding bar and is allowed to fall to the record-plate C by turning the cam *e* to the position shown in Fig. 9. The sliding bar *g* of the brake is loosely held in the tube *r*, which is secured to the base A. The said tube is provided with the cap *s*, which is held thereon by means of a screw-thread, and the rod *t*, by means of which connection is made with the sliding bar *g* of the brake, is located under the rod *k* and provided with a slot *u*, which embraces the pivot-stem *j*. The slotted end of the rod *t* is acted upon by the end of the sliding bar *g*, which is actuated by means of the cam *e*. The forward end of the rod *t* is not attached to the sliding bar of the

brake, but loosely enters the opening t' in the end of the brake-bar and is provided with a screw-thread and a nut v , which nut serves to control the degree of pressure exerted by the brake upon the periphery of the rotary table B. The sliding bar q of the brake is provided with the fixed collar w and with the loose sleeve x , the said sleeve being provided with the pin y , projecting through the slot z at the under side of the tube r and engaging with the cam a' , by means of which the said sleeve may be moved back against the forward action of the spiral spring b' , and between the collar w and the forward end of the tube r is placed the spiral spring c' . Now when it is desired to simultaneously raise the stylus E from the record-plate C and apply the brake the cam a' is to be kept in the position shown in Fig. 4 to hold the sleeve x in its backward position, thus allowing the spiral spring c' to carry the sliding bar q of the brake and the rod t back to the position shown in Figs. 1 and 3, and when it is desired to operate the brake independently of the cam e the said cam is to be so set that the loose sleeve x will be allowed to come forward, so as to rest against the collar w , as shown in Fig. 5, and then the spring b' being stronger than the spring c' will serve to cause the forward movement of the sliding bar q of the brake whenever the pin y of the sleeve x is released from the backward action of the cam a' .

A modification is shown in Fig. 2 in which the arm J, which carries the sounding-box and the stylus, is jointed for movement both horizontally and vertically, and in this case the rod k' forms a link between joint d' at the under side of the arm J and the joint e' of the slotted plate f' , so that upon turning the knurled head f the brake will be applied and the arm J raised simultaneously.

Another modification is shown in Fig. 2^a in which the sliding bar g is provided with a slot g' , adapted to receive the guiding-pin h' , and is also provided with the circularly-curved edge i' , which acts directly upon the boss j' of the swivel-jointed gravitating arm K, a corresponding curved surface i^2 being shown upon the rod k in Fig. 12, and in this construction the connection between the swivel-jointed arm and the lifting means will be maintained, and the arm may be carried to one side without materially changing its elevation during such movement.

I claim as my invention—

1. In a talking-machine, the combination of a horizontal rotating table, a swivel-jointed gravitating arm which carries the sounding-box and the stylus, and a spring-released brake for stopping the rotation of the table, with means for raising the gravitating arm of the sounding-box and stylus, and simultane-

ously applying the brake against the action of its spring.

2. In a talking-machine, the combination of a horizontal rotating table, a swivel-jointed gravitating arm which carries the sounding-box and the stylus, and a spring-released brake for stopping the rotation of the table, with means which when moved in one direction will cause the simultaneous raising of the gravitating arm of the sounding-box and stylus and the application of the brake, and when moved in the opposite direction will allow the simultaneous downward movement of the gravitating arm of the sounding-box and stylus and the releasing action of the spring of the brake.

3. In a talking-machine, the combination of a horizontal rotating table, a swivel-jointed gravitating arm which carries the sounding-box and the stylus, and the brake for stopping the rotation of the table, with a connecting-rod, the movement of which in one direction will cause the upward movement of the gravitating arm, and in the other will allow the downward movement of the same, the spring-released brake, the connecting-rod, the movement of which in one direction will cause the brake to engage with the rotating table, and in the opposite direction will allow the spring of the brake to cause the release of the table, and means for operating the said rods simultaneously.

4. In a talking-machine, the combination of a rotating table, a swivel-jointed gravitating arm which carries the sounding-box and stylus, the brake for stopping the rotation of the table, the rod, the movement of which in one direction will cause the upward movement of the gravitating arm and in the other will allow the downward movement of the same, the spring-released brake, the connecting-rod, the movement of which in one direction will cause the brake to engage with the rotating table and in the opposite direction will allow the spring of the brake to cause the release of the table, with the sliding bar, and the cam for operating the same, whereby the said rods may be operated simultaneously.

5. In a talking-machine, the combination of the arm swivel-jointed for horizontal movement, the arm swivel-jointed for vertical movement and carrying the sounding-box and the stylus, and the arm extending downward from the swivel-joint of the said vertically-moving arm, with the rod connected with the horizontally-moving arm and provided at its end with the open fork adapted for engagement with the said downwardly-extending arm, and also for allowing the full backward movement of the arm which carries the sounding-box and the stylus.

6. In a talking-machine, the combination

of a horizontally-rotating table, a swivel-jointed gravitating arm which carries the sounding-box and the stylus, with means for raising the gravitating arm of the sounding-
5 box and stylus, and a circular curved bearing-surface located between the said raising means and the gravitating arm, whereby the said arm may be turned to one side without materially changing its elevation or disturbing its connection with the elevating means.
HENRY A. JOHNSON.

Witnesses:

SOCRATES SCHOLFIELD,
DAVID H. ADAMSON.

No. 838,968.

PATENTED DEC. 18, 1906.

V. H. EMERSON.

SOUND RECORD AND SOUND RECORD TABLET.

APPLICATION FILED AUG. 19, 1906.



Inventor

Victor H. Emerson,

By

Witnesses
Ruth C. Fitzhugh

Gustave R. Thompson.

Mauro, Cameron, Lewis & Moore

Attorneys

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-RECORD AND SOUND-RECORD TABLET.

No. 838,968.

Specification of Letters Patent.

Patented Dec. 18, 1906.

Application filed August 19, 1905. Serial No. 274,908.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of New York city, New York, have invented a new and useful Sound-Record and Sound-Record Tablet, fully set forth in the following specification.

This invention relates to sound-records, and more particularly to a new sound-record tablet.

It has been proposed heretofore to make sound-record tablets of celluloid and also of compositions containing shellac. Each of these substances possesses certain properties which render them desirable as sound-record material, but there are also certain inherent objections to their use. Shellac is expensive, and the records heretofore made of shellac-containing compositions wear out rapidly and also act to quickly destroy the reproducing-stylus, such stylus requiring to be changed after each reproduction. When records are made of celluloid by impressing a matrix containing the sound-record in reverse, the celluloid does not take a clear and accurate impression, with the result that the record is more or less defective.

I have discovered that if shellac and crocus-powder or shellac alone be incorporated with the ordinary ingredients employed in making celluloid and the resulting composition employed as a sound-record tablet the objections heretofore existing to celluloid and to shellac are almost entirely eliminated, and a record of unusual quality is secured. This composition readily takes a clean-cut accurate impression from the matrix, producing a record of great durability and one which does not wear the reproducing-stylus to nearly the extent experienced with the old record, many reproductions being secured from the same stylus, and hence without the annoyance incident to a change of stylus at each reproduction. Moreover, the amount of shellac, and hence the incident expense, is greatly reduced.

In the production of celluloid guncotton is dissolved with camphor, the ingredients being ground and thoroughly mixed and the composition then treated in a manner well known to persons skilled in that art. According to my present invention I incorpo-

rate with the celluloid ingredients either shellac alone or shellac and crocus-powder, preferably during or in advance of the grinding and mixing of the celluloid ingredients, and then proceed in the usual manner of making celluloid.

The proportion of the various ingredients may of course be varied within limits; but the formula I have found to give the most satisfactory results consists of adding twenty per cent., (20%), by weight, of shellac to the usual celluloid mixture and (when crocus-powder is to be used) ten per cent., (10%), by weight, of crocus-powder. I preferably dissolve the shellac in any suitable solvent, as alcohol, and after incorporation with the celluloid mixture the whole mass is mixed and thoroughly ground, just as in the production of celluloid. If desired, any suitable pigment may be added, and in all other respects the usual method of making celluloid is followed.

My new composition is a normally hard body having many of the characteristics of celluloid, but differing therefrom in that it is harder and at the same time less yielding than celluloid. These properties make it much superior to celluloid as a material for sound-records, since it gives a harder and smoother surface for the reproducing-stylus, and it neither wears away the stylus nor is it worn by the stylus to the extent prevailing with record materials heretofore employed, particularly in what are known as the "zig-zag" form of records. In fact, a record made in a tablet of this new composition may be reproduced a great number of times without changing the stylus. Furthermore, since this material is less yielding than celluloid it does not "give" or yield laterally to the stylus, and hence produces a more accurate reproduction. This composition is formed into comparatively thin disks, and being hard and firm is capable of sustaining itself without the employment of any backing, though manifestly such backing may be used if desired. These disks then have sound-record grooves formed therein by impressing a matrix into their surfaces under heat and pressure, as in the ordinary way of making a record on a celluloid tablet.

While the proportions above set forth have

been found to give excellent results, it will be understood that the invention is not limited to the exact percentages named, since the benefits of my discovery follow to a greater or less degree when any appreciable quantity of shellac or its equivalent is incorporated—namely, a substitute for celluloid which presents a surface in every way better than celluloid or shellac for sound-records.

10 For convenient reference a drawing showing conventionally a sound-record and bearing a legend indicating its composition accompanies this specification.

What is claimed is—

15 1. A tablet for sound-records, consisting of a hard and self-sustaining body containing shellac in addition to the ingredients of celluloid.

20 2. A sound-record tablet composed of a homogeneous body containing shellac and the ingredients of celluloid.

3. A sound-record tablet consisting of a self-sustaining body composed of shellac and the ingredients of celluloid.

4. A sound-record tablet consisting of a self-sustaining body composed of shellac, 25 crocus-powder and the ingredients of celluloid.

5. A sound-record tablet consisting of a self-sustaining body composed of celluloid 30 and shellac.

6. A sound-record consisting of a tablet composed of shellac and the ingredients of celluloid and having irregularities corresponding to sound-waves formed therein. 35

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

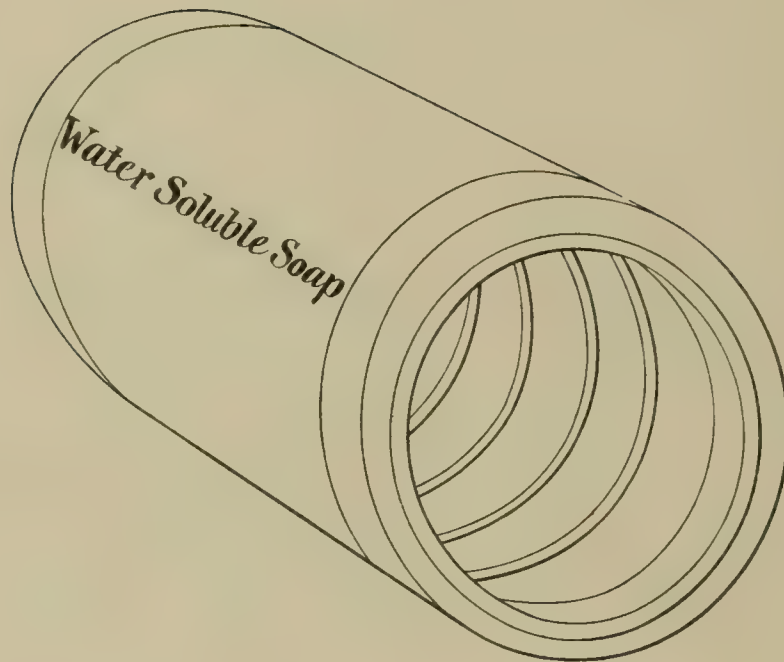
Witnesses:

WILLIAM E. HILLS,
W. H. HARTING.

No. 839,372.

PATENTED DEC. 25, 1906.

T. A. EDISON.
PHONOGRAPH RECORD OR BLANK.
APPLICATION FILED APR. 29, 1906.



Attest:
Edgeworth Greene
Deputy Notary

Inventor:
Thomas A. Edison
by *Frank L. Alger* Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY,
ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE,
NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH RECORD OR BLANK.

No. 839,372.

Specification of Letters Patent.

Patented Dec. 25, 1906.

Original application filed February 11, 1903, Serial No. 142,928. Divided and this application filed April 29, 1905. Serial No. 257,979.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph Records or Blanks, of which the following is a description.

This application is a division of an application filed February 11, 1903, Serial No. 142,928.

The object of my invention is the production of a phonograph-blank suitable for receiving a cut record corresponding accurately to sound-waves and free from extraneous surface variations or disturbances, so that no sound will be reproduced other than that representative of the true record. When a matrix or mold is used so as to faithfully copy such a master as I shall describe, the resulting duplicates obtained from the matrix or mold by well-known processes are superior to records as now made, whether original or duplicate, in a number of respects, which will be pointed out.

I find that in order to produce an absolutely perfect master from which a corresponding matrix or mold can be subsequently made it is necessary to employ a material or substance which is perfectly amorphous and without crystallization, that is uniform in structure, at least for a sufficient depth within its surface to receive the record, that has sufficient adhesion to permit a substantially continuous shaving to be cut by the recording device, and that, finally, is of such a character as to be readily cut by the recorder in order that the latter may form a perfectly smooth record, which while representative of the true vibrations shall not possess superfluous surface variations that at the present time and with present materials produce scratching and other extraneous sounds. When a material of this character is employed from which to construct the master, I find that owing to its relatively soft character much less power is required to cut it, so that all of the sound-vibrations will be recorded, even those representing the very weak overtones of musical instruments; also, that the depth of the record can be considerably increased, so as to thereby permit very loud sounds to be re-

corded without danger of the recorder vibrating clear of the surface, and, finally, that a perfectly smooth record will be cut, even when very deep, with a substantially continuous chip, so as to entirely eliminate the scratchy sounds now due to the mere cutting of the present material.

Preferably the invention consists in the employment, for the manufacture of the master, of a neutral or nearly neutral soap soluble in alcohol and in hot water and by preference a soda soap and in the manipulation of this material to put it into the required form for use in receiving a sound-record.

Reference is hereby made to the accompanying drawing, which illustrates diagrammatically a master-record embodying one form of my invention.

In carrying the invention into effect I prefer to proceed as follows: Any of the finer qualities of the soaps of commerce are cut in thin slices and, if necessary, are dried. Some of these soaps—like Pears' soap, for example—contain so little water that a special drying is not necessary. The dry sliced material is now dissolved in ethyl alcohol maintained in a heated state by hot water—in a water-jacket, for instance—until the alcohol is nearly saturated. A small quantity of water is added to clear the solution, which is then filtered through a fine cloth in a funnel heated by a surrounding water-jacket. The filtered solution is now heated in any suitable way until enough alcohol is evaporated to result in the production of a viscous mass capable of being cast into a blank by any of the well-known casting processes now used for manufacturing phonograph-blanks. These blanks may be either disk-like or cylindrical or of other form, according to the particular kind of records which are to be made. The blank after it has become cool is hard and firm enough to maintain its shape under normal conditions, its hardness depending upon the amount of water and alcohol remaining in the material. Blanks made in this way are now turned roughly to their approximate desired size and are allowed to season in a warm room for several days, during which they become gradually harder, due to further loss of alcohol and water. The blanks are then ready for use after they have been turned to the proper size for receiving

the record. Phonograph-blanks made in this way are transparent, perfectly amorphous, non-crystalline, and uniform in structure throughout, and they are capable of receiving a record of sound-vibrations whose track is perfectly polished. In these respects blanks or records made as I now suggest are distinguished from blanks or records made of the recording material now universally used, since the latter is not soluble in water, is very hard and semicrystalline, and results in the formation of a record which on reproduction produces scratchy and extraneous sounds in addition to those constituting the record itself.

Phonograph-blanks produced as I suggest are now used for receiving a sound-record made in any suitable sound-recording machine, either of the phonograph type, in which a record of varying depth is formed, or of the gramophone type, in which a sinuous record of substantially uniform depth is formed. In the making of original records at the present time, whether for use as masters or not, the ordinary wax-like material is quite friable, so that the material is removed by the recorder in the form of short chips. The removal of the material in this way makes the record-groove quite rough, and this roughness of the record-groove is materially increased if the recorder cuts too deeply into the material. Consequently at the present time very loud records are more scratchy than softer ones. With my improved recording material as used by me, owing to its relative softness, the recorder cuts out a practically continuous shaving and makes a perfectly smooth track, and this is true even if the cut of the record is quite deep. Consequently by the use of the new material I am enabled to employ recorders having a diameter as low as .015 of an inch, whereby I am enabled with no increase in the power used to cut a record at least twice as deep as is now possible with the recorders of standard size—namely, about .040 of an inch in diameter.

The new material I find is too soft to permit of direct reproduction by a reproducing device, since the small waves will be immediately obliterated by the reproducer. I therefore use a record obtained as described as a master, from which to construct a matrix or mold. To this end therefore I first provide the master with a conducting coating, preferably by a process of vacuous deposit, as described in my Patent No. 713,863, dated November 18, 1902. The coating thus formed is extremely thin and is so uniform that it follows all the variations of the record, however minute. Besides this, a conducting coating if applied in this way is so smooth and polished that when incorporated in the record-surface of the matrix or mold it will not of itself produce any extraneous sound. Having coated the master with a conducting-film, I now electroplate

copper thereon until a layer of the desired thickness is secured, after which the original master is removed, either by shrinking or dissolving it out. The matrix or mold is now preferably backed up by a protecting-shell and is used for the production of duplicates in any well-known way, formed of the usual hard wax-like materials. For instance, the matrix or mold can be employed for making duplicates by an expanding process, as specifically described in my Patent No. 713,209, dated November 11, 1902, in which a blank is engaged loosely with a matrix and expanded by heat and pressure to take an impression therefrom, after which the duplicates are contracted radially, so as to clear the record on the matrix, from which they are then removed, or in connection with a casting process, as described in my Patent No. 667,662, dated February 5, 1901, in which molten wax-like material is introduced into a mold and allowed to set therein, after which the resulting duplicate is contracted, so as to clear the record on the mold, from which it is then removed, or in connection with any other desired process by which a duplicate record can be obtained from a matrix or mold. In any event the duplicates so produced will be superior to those made at the present time from the matrices or molds secured from masters composed of the usual hard wax-like material in the following respects: First, owing to the amorphous, non-crystalline, and uniform character of the master the record formed therein will be free from extraneous sounds, and this will also be true of the resulting duplicates; second, owing to the fact that the master is formed of comparatively soft material the record made therein is more nearly representative of the sound-vibrations than is possible with harder materials, so that the resulting duplicates will more faithfully reproduce the original sounds, including even the finer overtones of musical instruments; third, owing to the ease with which the material can be cut the record formed in the master can be made very deep, so that the reproductions obtained from the resulting duplicates will be correspondingly increased in volume.

While I have described as the preferred material one formed by the dissolving of a soluble soap, by then clarifying the solution, and by finally evaporating the solvent, it will be understood that other soluble, amorphous, non-crystalline, and uniform substances may be employed in addition to soap, by which harder or softer blanks can be obtained.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. A phonograph record or blank formed of a perfectly amorphous, solidified, water-soluble soap, substantially as set forth.
2. A master for use in the production of

matrices or molds, comprising a suitable tablet formed of a perfectly amorphous, water-soluble soap and carrying a smooth polished sound-record groove free from extraneous variations, substantially as set forth.

5 3. A phonograph record or blank composed of a soap hard enough to receive a polished surface from a cutting tool or stylus, but not hard enough to be capable of repro-

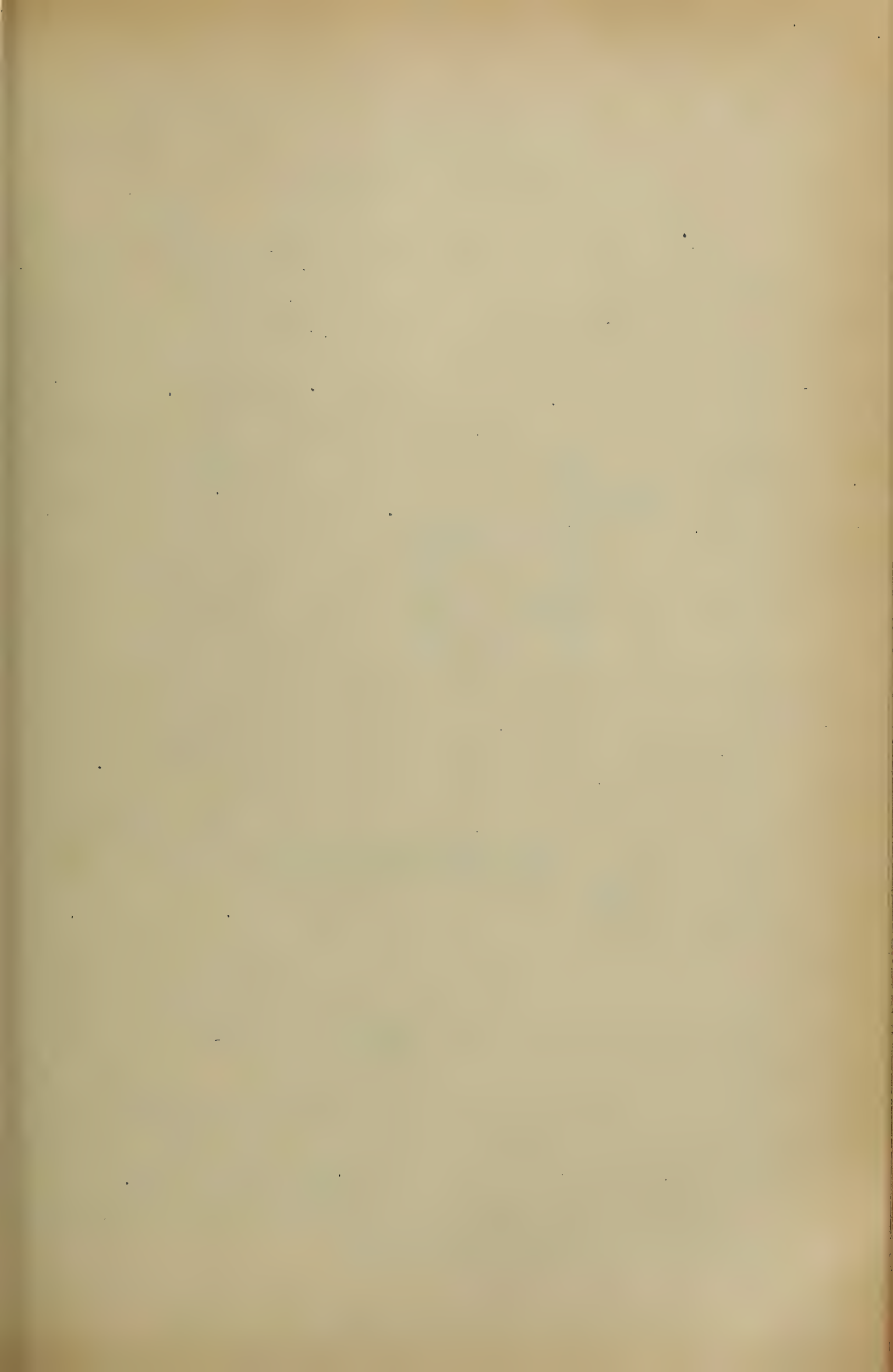
duction by direct engagement of a reproducing-stylus, substantially as set forth.

This specification signed and witnessed this 28th day of April, 1905.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.



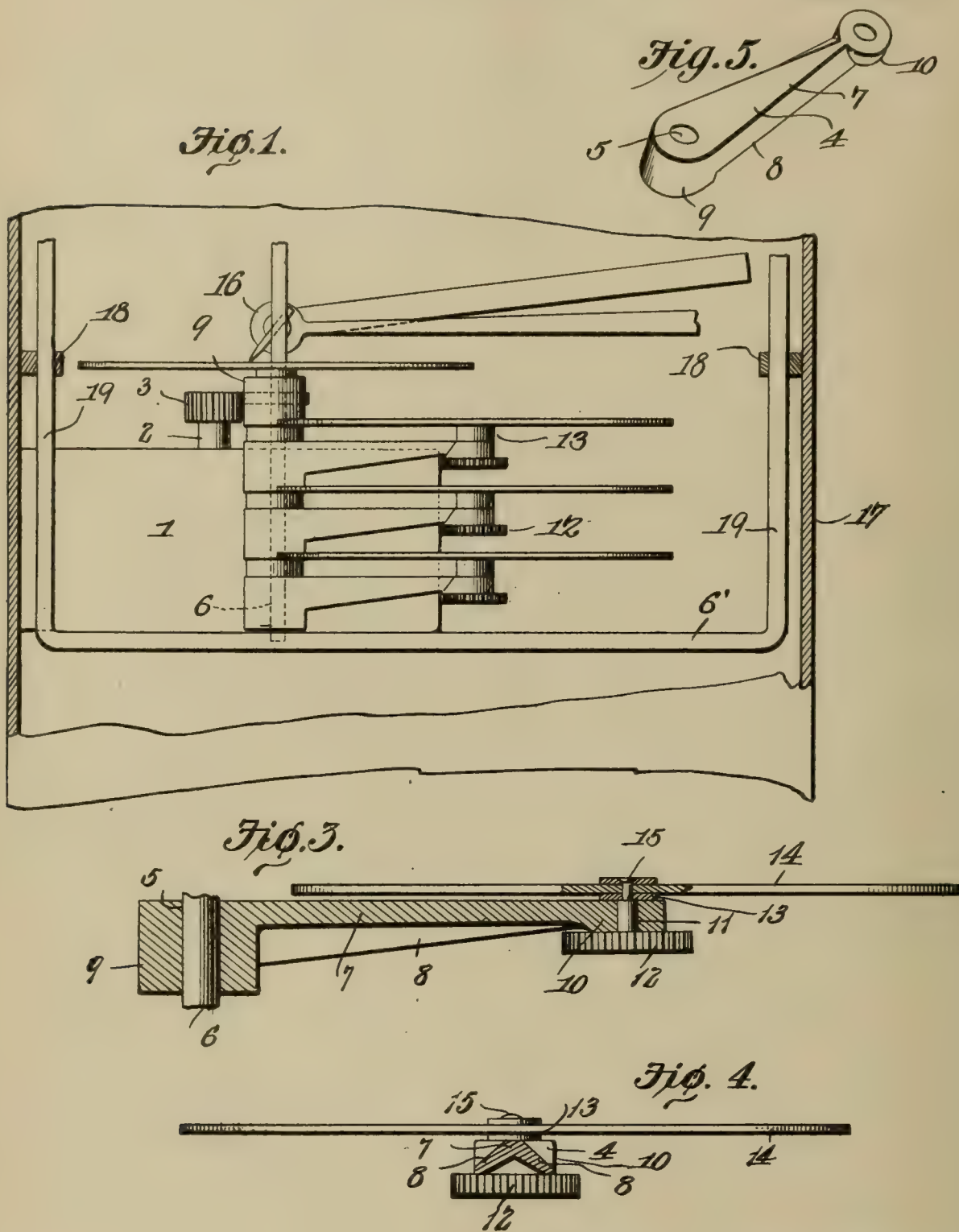
No. 839,902.

PATENTED JAN. 1, 1907.

W. C. SPURGEON.
PHONOGRAPH AND DISK HOLDER.

APPLICATION FILED JUNE 26, 1906.

2 SHEETS—SHEET 1.

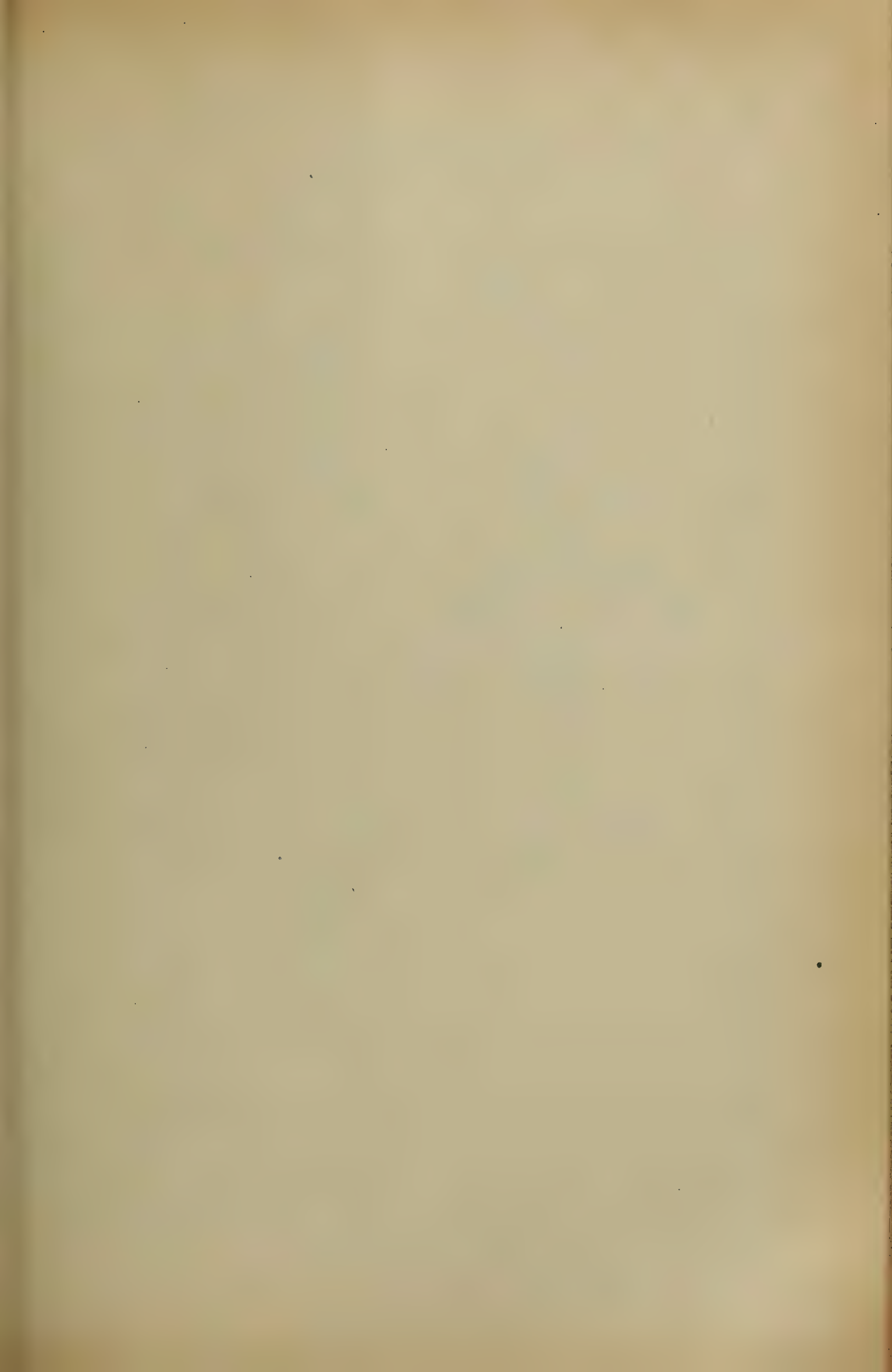


WITNESSES:

E. H. Stewart
E. H. Stewart

Walter C. Spurgeon,
INVENTOR

By *C. A. Snow & Co.*
ATTORNEYS



No. 839,902.

PATENTED JAN. 1, 1907.

W. C. SPURGEON.
PHONOGRAPH AND DISK HOLDER.

APPLICATION FILED JUNE 26, 1906.

2 SHEETS—SHEET 2.

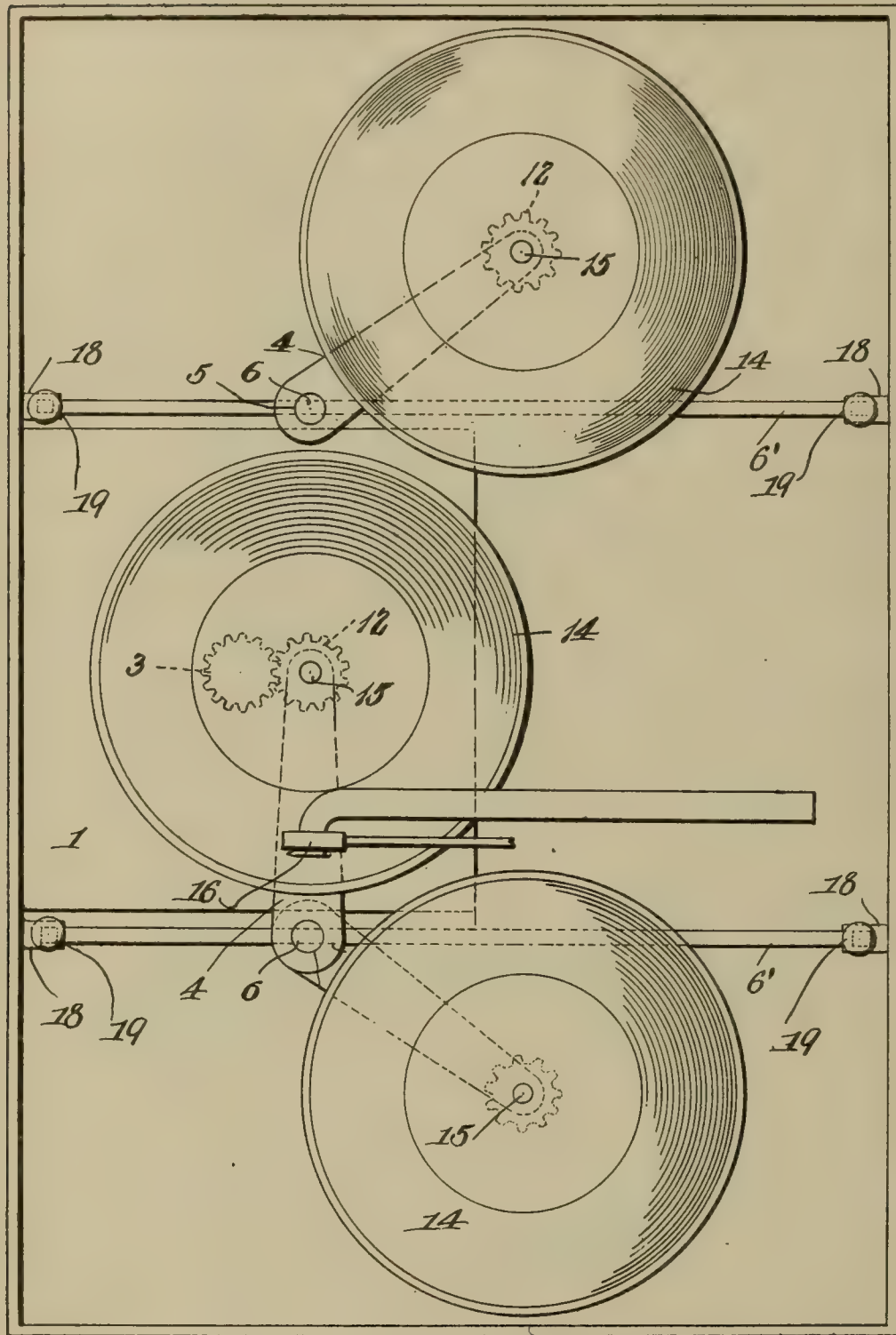


Fig. 2.

WITNESSES:

E. H. Stewart
Edmund Stewart

Walter C. Spurgeon,
INVENTOR

By *C. A. Snow & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

WALTER CARL SPURGEON, OF MILROY, INDIANA.

PHONOGRAPH AND DISK-HOLDER.

No. 839,902.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed June 26, 1906. Serial No. 323,506.

To all whom it may concern:

Be it known that I, WALTER CARL SPURGEON, a citizen of the United States, residing at Milroy, in the county of Rush and State of Indiana, have invented a new and useful Phonograph and Disk-Holder, of which the following is a specification.

This invention has relation to phonographs and disk-holders; and it consists in the novel construction and arrangement of its parts, as hereinafter shown and described.

The object of the invention is to provide a phonograph with a disk-holding means whereby any one of a number of disks may be brought into position with relation to the motor and the reproducer whereby the record may be produced. The disks are mounted on holders of special construction. The disk-holder consists of disk-supporting arms journaled upon a vertically-arranged shaft. Said shaft in turn is mounted upon a frame which is adapted to be moved up and down, a means being provided for retaining said frame at certain elevations. At the end of each disk-supporting arm is journaled a shaft. To the lower end of said shaft is fixed a gear-wheel, and to the upper end of said shaft the disk is attached. A gear-wheel is fixed to the upper end of the motor-shaft, and the said arms are adapted to be swung so that their gear-wheels may be brought in mesh with the gear-wheel on the motor-shaft. A number of sets of arms are suitably arranged about the motor so that their disks may be operated by the same, and at the same time a single reproducer may be used for reproducing the record from any particular disk.

In the accompanying drawings, Figure 1 is a sectional view of the casing, showing a side elevation of the lower part of one of the frames and a few disks, the top one being shown in contact with the motor. Fig. 2 is a top plan view of the casing, showing the arrangement of two sets of disks. Fig. 3 is a longitudinal sectional view of one of the disk-supporting arms. Fig. 4 is a transverse sectional view of one of the disk-supporting arms, and Fig. 5 is a perspective view of one of the disk-supporting arms.

The phonograph consists of the motor 1, which may be either spring-actuated or electric, and to the upper end of the shaft 2 thereof is fixed the gear-wheel 3. The disk-supporting arm 4 is provided at one end with

the perforation 5, which is adapted to receive the shaft 6, which is fixed at its lower end to the frame 6'. The disk-supporting arm 4 consists of the solid upper portion 7, which extends throughout its entire length, and the side flanges 8 8, depending therefrom and increasing in thickness from the lower edges toward the solid portion 7. Said flanges 8 8 prevent the arm 4 from bending under the weight of the disk. Said flanges 8 8 are also pitched at acute angles to the upper surface of the portion 7. The inner end of the disk-supporting arm 4 is cylindrical, as at 9, and its outer end is also cylindrical, as at 10. The lower edges of the flanges 8 extend substantially from the lower edge of the cylindrical portion 9 to the lower edge of the cylindrical portion 10, the portion 9 being thicker than the portion 10. The entire upper surface of the disk-supporting arm is in the same plane. The shaft 11 is journaled in the cylindrical portion 10 of the said arm, and to the lower end of said shaft 11 is fixed a gear-wheel 12. A washer 13 is located upon said shaft 11 and rests upon the upper surface of the disk-supporting arm 4. The disk 14 rests upon the washer 13, and the disk-clamping means 15 fits upon the upper end of the shaft 11 and engages the upper surface of the disk 14. The disk-supporting arms 4 are suitably arranged about the gear-wheel 3 of the motor 1, so that any arm may be swung as to bring its gear-wheel in mesh with the said motor gear-wheel. The reproducer 16 is so arranged as to have its needle-point operate in the grooves of any disk when it is in turn in operative communication with the motor.

The frame 6' is adapted to be vertically adjusted manually in the casing 17. The said casing is provided on its inner sides with the oppositely-arranged guides 18 18. The ends 19 19 of the frame 6' extend vertically and pass through the guides 18 18 and are held at the desired points therein by frictional contact therewith. It is obvious that as the said frame 6' is raised or lowered any disk 14 of a set may be brought to such a level as to be swung into operative engagement with the gear-wheel 3 of the motor. It will thus be seen that the disks are retained in convenient proximity to the motor and by being so mounted any particular disk may be readily thrown into operative engagement with the motor while the disks not in use are

swung back on their respective arms out of the way. frame supporting said shaft and snug-fitting 10
guides receiving said frame.

Having described my invention, what I claim as new, and desire to secure by Letters
5 Patent, is In testimony that I claim the foregoing as
my own I have hereto affixed my signature
in the presence of two witnesses.

The combination with a motor, a vertically-adjustable shaft located in the vicinity thereof, a plurality of disk-supporting arms journaled on said shaft, a vertically-movable

WALTER CARL SPURGEON.

Witnesses:

MYRON A. PARDUN,
ARIE M. TAYLOR.



UNITED STATES PATENT OFFICE.

CLEMENT A. CORNWALL, OF ASHCROFT, BRITISH COLUMBIA, CANADA.

GRAMOPHONE SPEED-INDICATOR.

No. 839,920.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed August 9, 1906. Serial No. 329,857.

To all whom it may concern:

Be it known that I, CLEMENT A. CORNWALL, a citizen of Canada, residing at Ashcroft, in the Province of British Columbia, Canada, have invented a new and useful Gramophone Speed-Indicator, of which the following is a specification.

This invention relates to an improved means for indicating the movement of the brake-screw by which the speed of the mechanism which rotates a gramophone-record is controlled.

The mechanism by which a gramophone-record is rotated is generally controlled by a small brake acting on the periphery of a rotatable part of the mechanism, which brake is operated by a screw threaded through the casing and bearing on the end of the lever to which the brake is attached. The movement of the screw to effect a variation of the speed of rotation is so slight that difficulty is experienced in setting the brake to give any desired speed. This difficulty I have overcome by providing a light pointer which will multiply the movement of the brake-screw or its lever and will indicate the amount of such movement on a graduated scale, so that if a certain position of the pointer is found to give a satisfactory speed for any particular record the corresponding number on the scale may be noted on the record and the brake control may be again set to that mark with some assurance that the same result will be attained.

There are also other novel features in the arrangement and application of the device to which attention is drawn in the following specification, which fully describes my invention, reference being made to the drawings by which it is accompanied, in which—

Figure 1 is a perspective view of a gramophone with my invention applied. Fig. 2 is a vertical longitudinal section thereof, showing my invention and the parts immediately connected therewith, the remaining portion of the gramophone mechanism being omitted for clearness of illustration. Fig. 3 is a cross-section thereof.

In the drawings, 2 represents the casing or box which incloses the mechanism, 3 being the base. 4 is the lever by which the brake is applied, and 5 the screw by which such lever is operated.

Adjacent to the end of the brake-lever 4

to which the screw 5 is applied is pivotally mounted on a fulcrum-pin 6 a light lever 10, the short end 11 of which is in engagement with the under side of the lever 4 and the longer end is produced through a vertical slot 13 in the casing 2 to form an indicating-pointer 12. The fulcrum-pin 6 is secured in a member 7, vertically adjustable in an attachment 8, secured to the base 3 of the casing by a screw 9 in an elongated aperture 16. The edge of the slot 13 of the casing is provided with a graduated scale 14, and the slot may be covered with a glass 15 to exclude dust.

Any movement of the end of the lever 4 to vary the speed of the record-rotating mechanism will thus be multiplied and indicated by the pointer 12 on the scale 14, and the reading on the scale for the various records may be noted on them to afford a means for future setting of the brake without the necessity of preliminary trial.

The vertical movement of the fulcrum-pin 6 affords a means for setting the pointer 12 to the graduations of the scale.

The device is simple and readily applied and requires no alteration of existing mechanism.

Having now particularly described my invention and the manner of its application and use, I hereby declare that what I claim as new, and desire to be protected by Letters Patent, is—

1. The combination with the pivotally-mounted brake-lever of a gramophone and an adjusting-screw therefor, of a pivotally-mounted pointer, a support to which said pointer is pivotally mounted, said support comprising a fixed base member having a slideway, a supplemental member connected to said fixed base member and held in said slideway, said supplemental member having a slot portion, a set-screw passing through said slot portion into the fixed member, and a graduated scale coöperating with the free end of said pointer, substantially as shown and described.

2. In a device of the class described, the combination with the brake-lever, of a pivotally-mounted pointer coöperating therewith, a support to which said pointer is pivotally mounted, said support comprising a fixed adjustment and a member vertically adjustable in said fixed adjustment, said pointer being

5 pivotally mounted to said vertically-adjustable member, a casing for the whole, said casing having a slot through which the end of the pointer projects, a graduated scale secured to the casing adjacent the slot, and a glass covering for the slot and the scale substantially as shown.

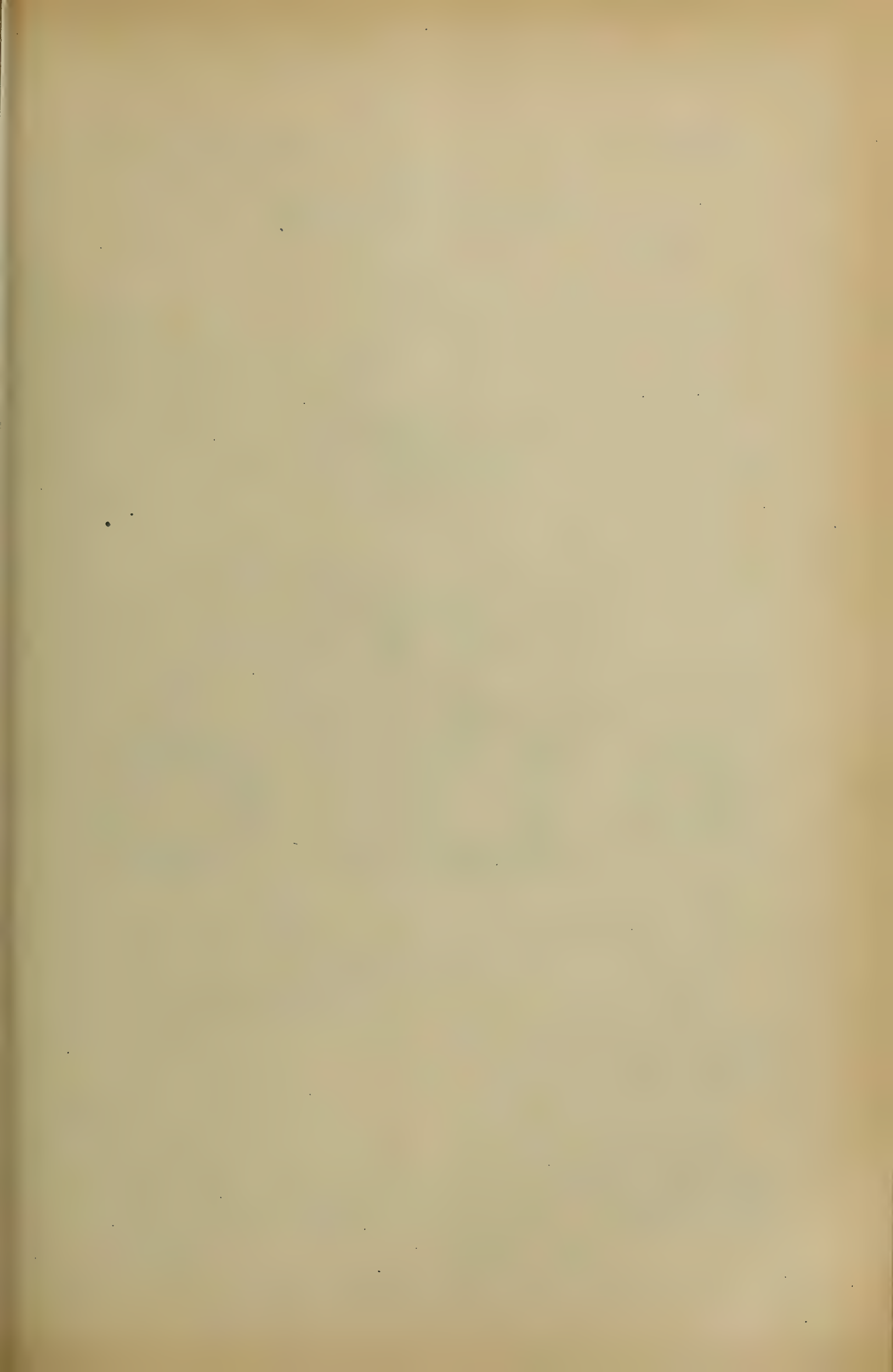
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLEMENT A. CORNWALL.

Witnesses:

CLEMENT FRANCIS CORNWALL,

FITZALAN V. CORNWALL.



No. 840,089.

PATENTED JAN. 1, 1907.

A. H. RYDER.
SOUND REGULATOR FOR PHONOGRAPHS.
APPLICATION FILED SEPT. 1, 1905.

Fig: 1,

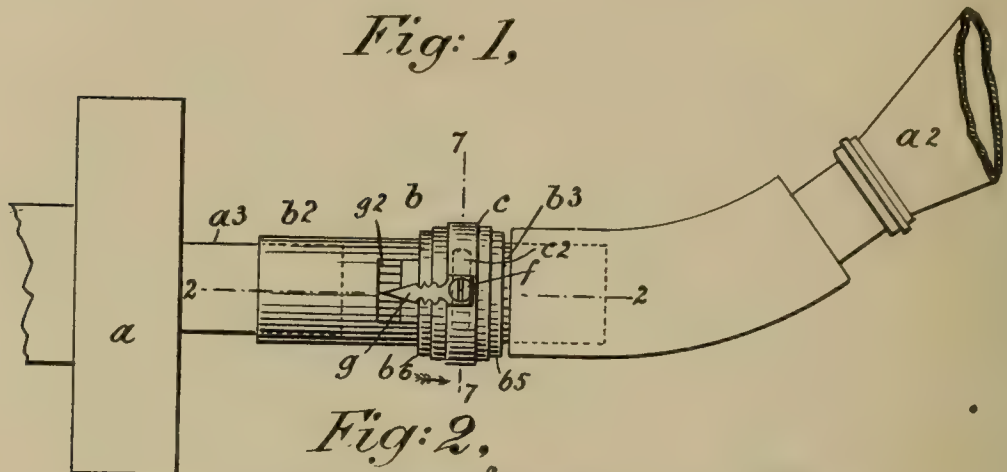


Fig: 2,

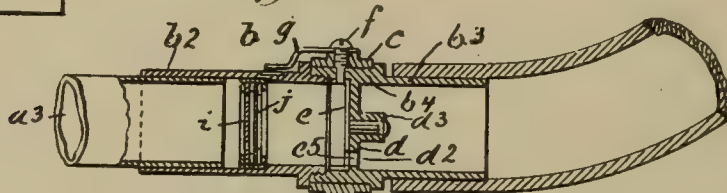


Fig: 4,

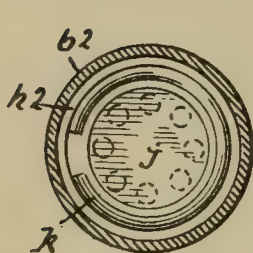


Fig: 3,

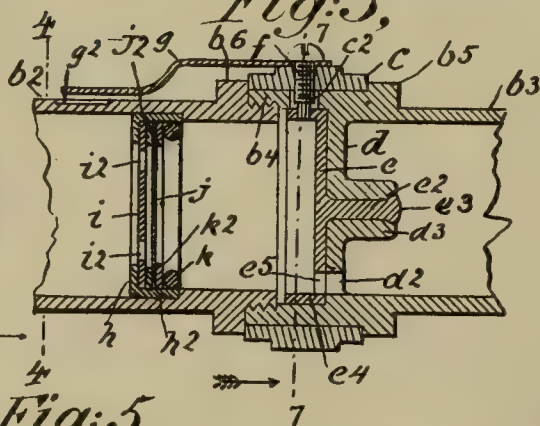


Fig: 7,

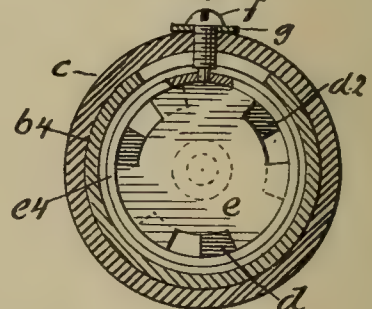


Fig: 5,

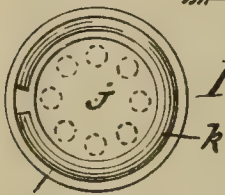


Fig: 9,

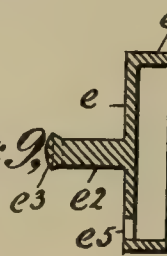


Fig: 6,

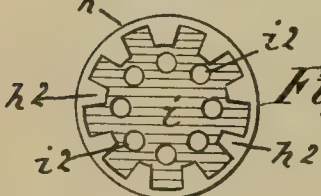
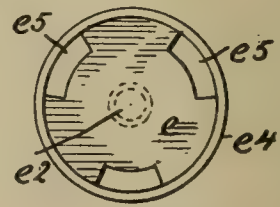


Fig: 8,



WITNESSES
E. A. Hageny.
J. A. Stewart

BY HIS

INVENTOR
Arthur H. Ryder,
Edgar Sale & Co
ATTORNEYS

UNITED STATES PATENT OFFICE.

ARTHUR H. RYDER, OF NEW YORK, N. Y.

SOUND-REGULATOR FOR PHONOGRAPHS.

No. 840,089.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed September 1, 1905. Serial No. 276,740.

To all whom it may concern:

Be it known that I, ARTHUR H. RYDER, a citizen of the United States, residing in the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Sound-Regulators for Phonographs and other Talking-Machines, of which the following is a specification, such as will enable those skilled in the art to which my invention relates to make and use the same.

The object of this invention is to provide improved means for connecting the horn of a talking-machine or other machine of the class specified to the machine proper, whereby the metallic vibrations or rasping metallic sounds usually produced by machines of this class are in a measure done away with and a more regular and musical tone or voice-tone produced, a further object being to provide an improvement of the class specified for use in connection with the delivery-horns of talking-machines and similar instruments, whereby the sound-waves are prevented from traveling around the horn in spiral curves and whereby the harsh grating or similar metallic sounds are to a considerable extent obviated and whereby the operator may at will regulate the volume of sound produced by the horn, a still further object being to provide a horn-coupling for instruments of the class specified containing a supplemental vibratory device; and with these and other objects in view the invention consists in an attachment for instruments of the class specified constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a side view of my improved horn attachment for instruments of the class specified and showing the method of connecting it with the machine and with the horn; Fig. 2, a sectional view of the attachment on the line 2 2 of Fig. 1; Fig. 3, a view similar to Fig. 2, but showing the attachment proper on an enlarged scale; Fig. 4, a section on the line 4 4 of Fig. 3; Fig. 5, an end view of a supplemental vibratory device which I employ; Fig. 6, a reversed side view of the vibratory device shown in Fig. 5; Fig. 7, a section on the line 7 7 of Fig. 1 and on the line 7 7 of

Fig. 3 and also a similar section through Fig. 2; Fig. 8, a side view of a valve-plate which I employ, and Fig. 9 a transverse section thereof.

In the drawings forming part of this specification I have shown at *a* the reproducer of a talking-machine or other sound or musical reproducing machine and at *a*² the delivery-horn thereof. The reproducer *a* is provided with the usual tube *a*³, with which in practice my improved horn-attaching device *b* is connected. The horn-attaching device *b* in the form of construction shown comprises a tube made of two parts *b*² and *b*³, and the part *b*³ in the form of construction shown is provided with an enlarged inner end member *b*⁴, into which the part *b*² is screwed, and mounted on the enlarged end member *b*⁴ of the part *b*³ is a collar or band *c*, said collar or band being rotatable and being placed between annular beads *b*⁵ and *b*⁶, formed, respectively, on the tube members *b*³ and *b*².

The enlarged part *b*⁴ of the tube member *b*³ is provided approximately centrally thereof with a transverse partition *d*, having oblong ports or passages *d*² arranged concentrically of the center thereof, and placed on the inner face of said partition is a rotatable valve-plate *e*, provided with a central stud *e*², which passes outwardly through the partition *d* and through a central hub *d*³ formed thereon, and the head of which is enlarged, as shown at *e*³, to prevent its movement longitudinally of the attachment, and said valve-plate is provided with a flange or rim *e*⁴, and passing through the collar or band *c* and through the transverse oblong slot *c*² in the end member *b*⁴ of the tube member *b*³ is a screw *f*, which passes into and is secured in the flange or rim *e*⁴ of the valve-plate *e*, and by means of which said valve-plate may be turned, and the said valve-plate is provided with concentrically - arranged oblong slots forming ports or openings *e*⁵, which are adapted to register with the corresponding ports or openings *d*² in the partition *d*.

Secured to the collar or band *c* by the screw *f* is a pointer *g*, which ranges longitudinally of the tube member *b*² and is adapted to operate in connection with a transverse scale *g*², formed on said tube member, and removably placed in the tube member *b*² is a supplemental vibratory device comprising a collar *h*, said collar being provided at its outer end with inwardly-directed projections *h*². Within the collar *h* of the supplemental

vibratory device is placed a rigid disk i , preferably composed of fiber and provided with small ports or passages i^2 , which in the form of construction shown are arranged concentrically around the center thereof, and placed on the side of the disk i adjacent to the valve-plate e is a flexible diaphragm j , also preferably composed of fiber and separated from the disk i by an annular band or gasket j^2 , and the diaphragm j is held in the diaphragm-collar h by an open spring-ring k , between which and said diaphragm is placed an annular gasket k^2 .

As thus constructed it will be seen that the volume of vibratory sound passing through the partition d may be regulated at all times by turning the valve-plate e , which is done by turning the collar or band c , and the pointer g operating in connection with the scale g^2 will tell to what extent the ports or passages d^2 in the partition d are opened and closed.

In the operation of this device the sound-waves from the reproducer a first impinge on the perforated disk i of the vibratory device within the tubular member b^2 , which, being constructed of non-metallic substance, insulates all grating, harsh, or indistinct sounds foreign to the record, and the said sound-waves pass through said disk and strike against the sensitive diaphragm j , which sets up a new series of sound-waves which are deprived of their tendency toward a spiral movement and which may be regulated in volumes at the will of the operator by turning the collar or band c . The result of this is to produce a more perfect tone, voice, or musical sound which is to an extent free from the metallic and harsh qualities usually produced by instruments of this class.

As thus constructed it will be seen that my improvement involves a regulator placed between the delivery-horn and the reproducer and comprising in its construction a vibratory diaphragm, a stationary sound-regu-

lating diaphragm, and a supplemental-volume or sound-volume regulating device involving a rotatable member located in the axis of the sound-waves passing through the reproducer, and while I prefer the construction shown and described it will be apparent that changes therein and modifications thereof may be made without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

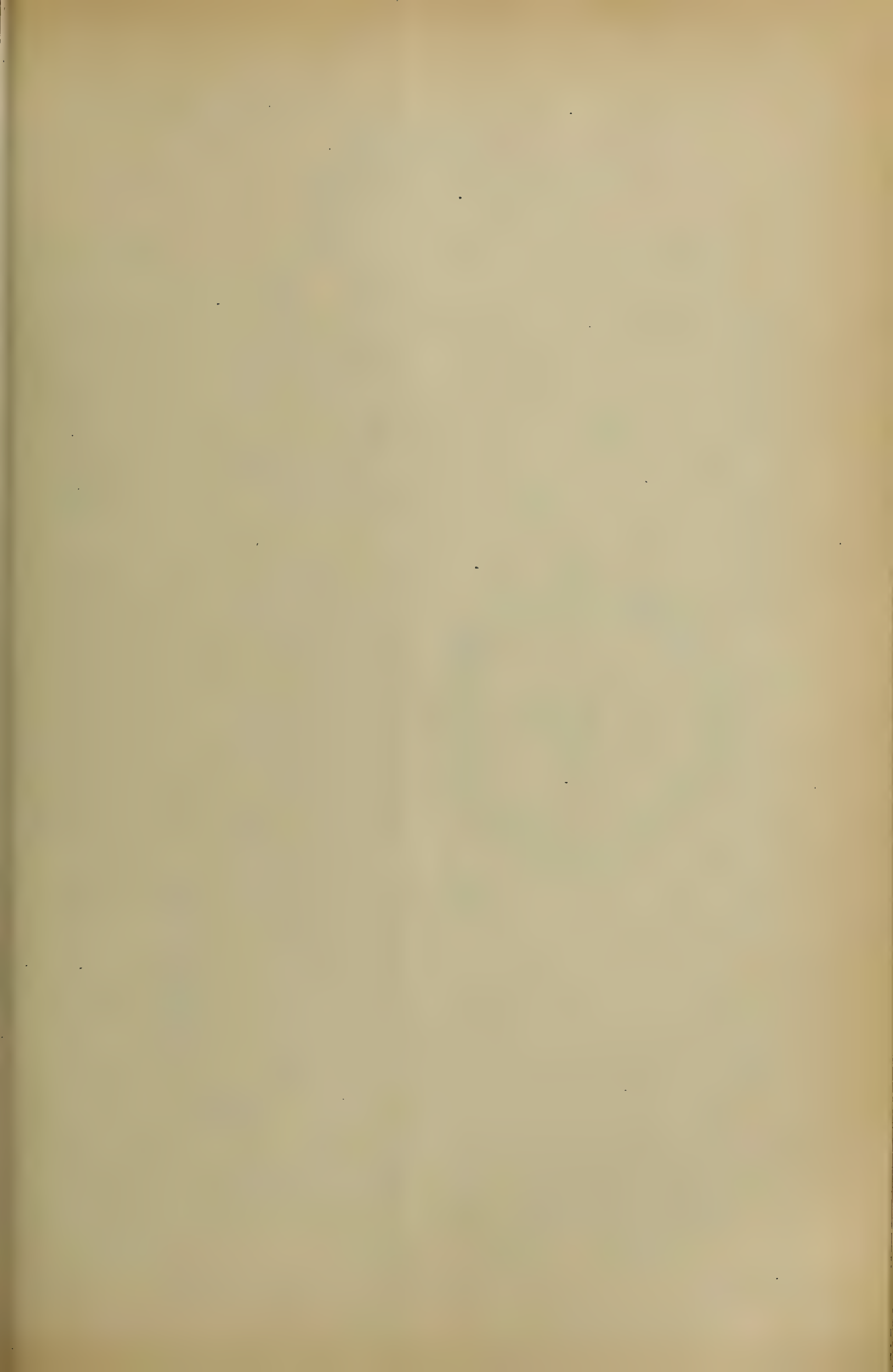
1. The herein-described means for connecting the horn of a reproducing instrument with said instrument, comprising a tubular coupling having a fixed transversely-arranged apertured plate therein and an apertured valve-plate coöperating with said fixed plate, and external devices movable independently of the coupling whereby said valve-plate may be rotated and the extent of said rotation indicated, said coupling being also provided in the end thereof adjacent to the instrument with a supplemental vibratory device.

2. The herein-described means for connecting the horn of a reproducing instrument with said instrument, comprising a tubular coupling having a fixed transversely-arranged apertured plate therein and an apertured valve-plate coöperating with said fixed plate, and external devices movable independently of the coupling whereby said valve-plate may be rotated and the extent of said rotation indicated, said coupling being also provided in the end thereof adjacent to the instrument with a supplemental vibratory device, consisting of a transversely-arranged perforated disk and a vibratory diaphragm adjacent thereto.

ARTHUR H. RYDER.

Witnesses:

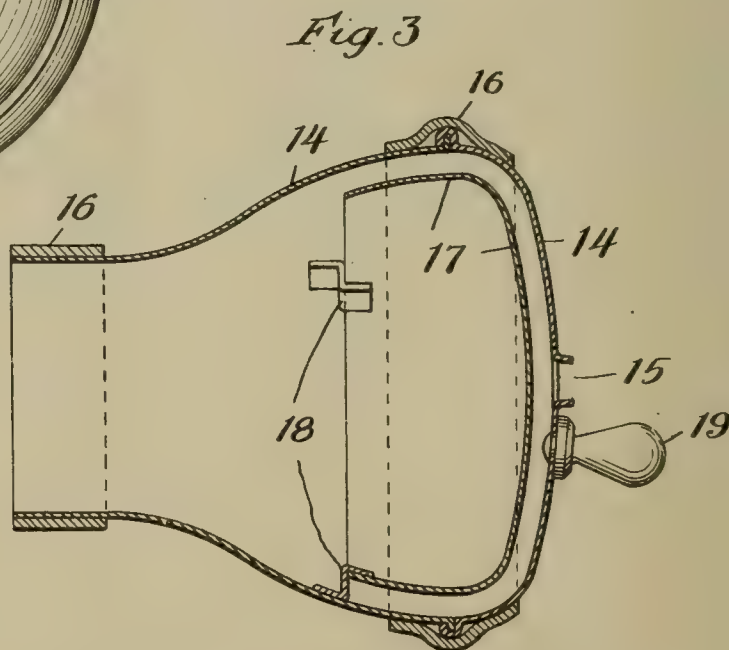
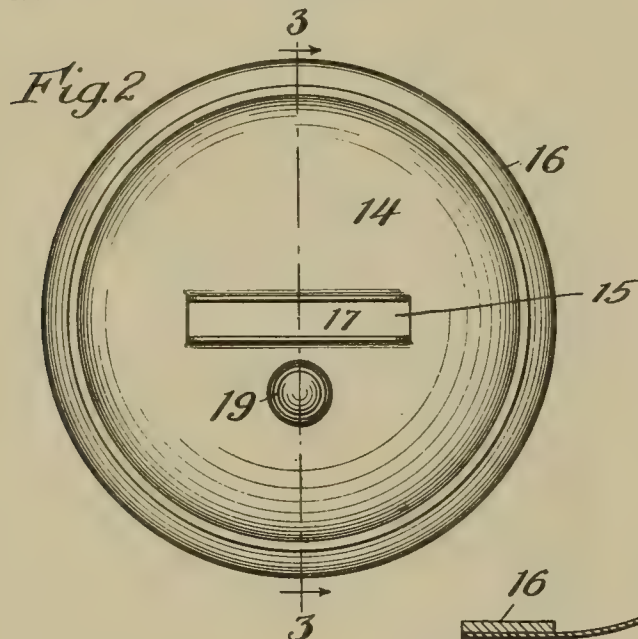
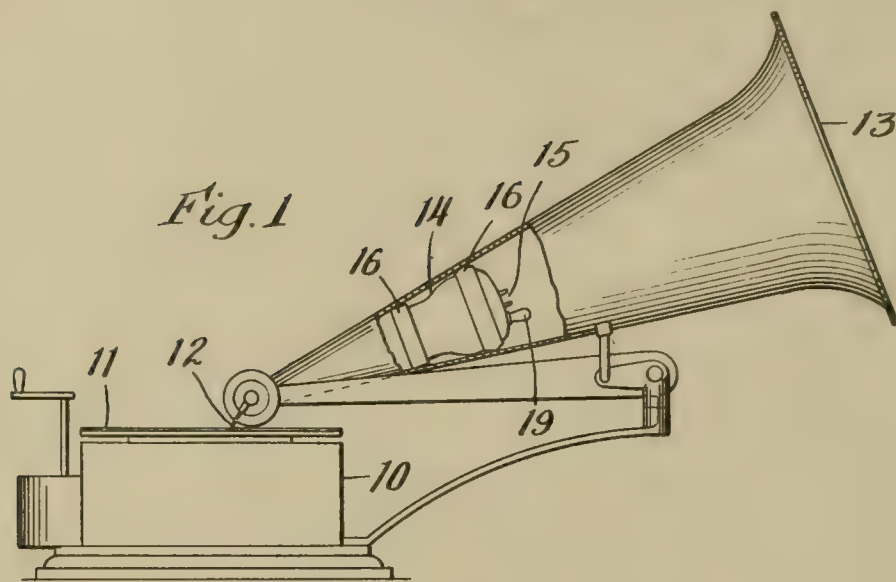
M. M. LIEBY,
W. D. WARD.



No. 840,526.

PATENTED JAN. 8, 1907.

A. S. THOMPSON.
MODIFIER FOR PHONOGRAPHS.
APPLICATION FILED MAR. 31, 1906.



Witnesses

Wm Geiger
Ben Moyses

Inventor:

Ashley S. Thompson
By Henry Love Clarke
his Atty.

UNITED STATES PATENT OFFICE.

ASHLEY S. THOMPSON, OF CHICAGO, ILLINOIS.

MODIFIER FOR PHONOGRAPHS.

No. 840,526.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed March 31, 1906. Serial No. 309,037.

To all whom it may concern:

Be it known that I, ASHLEY S. THOMPSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Modifiers for Phonographs, of which the following is a specification.

My invention relates to and has for its object the reduction and the modification of the sound emitted from the horn of a phonograph for the purpose of softening the tone and removing the unpleasant metallic timbre that is frequently present.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side view of a phonograph or graphophone with a portion of the horn broken away to show the modifier device in place therein. Fig. 2 is a top plan view of the modifier, and Fig. 3 is a sectional view on the line 3 3 of Fig. 2.

Like reference-numerals indicate like parts in all of the figures.

10 is a diagrammatic indication of a phonograph or graphophone with a record 11 in place thereon and the stylus 12 shown in contact with the upper face of the record.

13 is the horn through which the sound from the diaphragm is emitted. The modifier device is shown in place in the throat of the horn in Fig. 1. The main body of said device is a piriform metallic shell 14, having its lesser end open and its greater end provided with a restricted two-lipped orifice 15. Said piriform shell is provided with a pair of rubber washers or mufflers 16, 16 for retaining the device in place in the throat of the horn and preventing sound vibrations from passing around the aforesaid shell exteriorly. A resonant metallic reflector 17 is secured within the greater end of the piriform shell 14. This reflector has a diameter slightly less than the greatest inner diameter of the shell and about the same curvature as the portion of the shell adjacent to it and is so supported by the lugs 18 18 that it is nowhere in contact with the inner surface of said shell, thus making a narrow passage entirely around said reflector between it and the inner face of the shell and leading to the orifice 15, which is opposite the convex top of said reflector.

A handle 19 is provided to facilitate placing the device in the throat of the horn and removing it therefrom.

The sound-waves given out from the dia-

phragm of the phonograph and transmitted through the basal portion of the throat of the horn enter the open lesser end of the piriform shell and impinge against the inner surface of the reflector. Some portion of these vibrations may pass through said reflector directly into the open space between its outer surface and the inner face of the shell, and thus be transmitted to and through the orifice 15; but a great part is entirely absorbed and the remainder reflected against the inner face of the middle portion of the shell and thence further transmitted, by repeated reflections, through the narrow space around the reflector, between it and the inner face of the shell, to and through the orifice 15. The net result of this absorption and repeated reflection of the sound vibrations is found to be a substantial reduction of the volume of the sound and the removal of all or nearly all of the metallic timbre that is a commonly unpleasant feature of the rendering of any record upon a phonograph.

The form given the shell and reflector may be varied to some extent; but its general character must be such that few of the sound-waves coming from the basal portion of the throat of the horn shall be permitted to pass without impinging upon said reflector and being either reflected from or absorbed in or transmitted through it, depending upon the character of the vibrations and the angles of incidence of the waves, and the rubber mufflers provided on the exterior of the piriform shell prevent any sound vibrations from passing around it, with the result that all not absorbed by said mufflers must pass through the shell and be subjected to the interference of its inner walls and contained reflector. It is found that the orifice in the outer or greater end of the shell should be relatively small and that the softest and least metallic or whistling effect is secured by having such orifice somewhat elongated and outwardly lipped.

My invention is shown in the drawings as embodied in a particular and preferable form; but it may be otherwise embodied within the scope of the claims hereinafter made and as distinguished from prior devices for like purpose.

I claim—

1. A modifier for phonographs, adapted to fit in the throat of the horn, and consisting in the combination of, a piriform shell having

its lesser end open and its greater end provided with a restricted orifice, a resonant reflector secured within said greater end of the shell, and a muffler whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

2. A modifier for phonographs, adapted to fit in the throat of the horn, and consisting in the combination of, a piriform metallic shell having its lesser end open and its greater end provided with a restricted orifice, a resonant reflector secured within said greater end of the shell, and a muffler whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

3. A modifier for phonographs, adapted to fit in the throat of the horn, and consisting in the combination of, a piriform shell having its lesser end open and its greater end provided with a restricted lipped orifice, a resonant reflector secured within said greater end of the shell, and a muffler whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

4. A modifier for phonographs, adapted to fit in the throat of the horn, and consisting in the combination of, a piriform shell having its lesser end open and its greater end provided with a restricted orifice, a resonant reflector secured within said greater end of the shell and convexly presented to said orifice, and a muffler whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

5. A modifier for phonographs, adapted to

fit in the throat of the horn, and consisting in the combination of, a piriform shell having its lesser end open and its greater end provided with a restricted orifice, a resonant reflector secured within said greater end of the shell and nearly equaling the greatest inner diameter thereof, and a muffler whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

6. A modifier for phonographs, adapted to fit in the throat of the horn, and consisting in the combination of, a piriform shell having its lesser end open and its greater end provided with a restricted orifice, a resonant reflector secured within said greater end of the shell, and mufflers whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

7. A modifier for phonographs, adapted to fit within the throat of the horn, and consisting in the combination of, a piriform metallic shell having its lesser end open and its greater end provided with a restricted lipped orifice, a resonant reflector secured within said greater end of the shell and nearly equaling the greatest inner diameter thereof and convexly presented to said orifice, and mufflers whereby sound-vibrations are prevented from passing around said shell exteriorly, substantially as specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ASHLEY S. THOMPSON.

Witnesses:

HENRY LOVE CLARKE,

I. F. STEVENS.

No. 840,932.

PATENTED JAN. 8, 1907.

B. B. GOLDSMITH.
SOUND RECORD TABLET.
APPLICATION FILED DEC. 13, 1906.



Witnesses:

Edmund L. Jewell
H. J. Chapman

Inventor:

Byron B. Goldsmith,

By Lyons & Bisping.

Attorneys.

UNITED STATES PATENT OFFICE.

BYRON B. GOLDSMITH, OF NEW YORK, N. Y.

SOUND-RECORD TABLET.

No. 840,932.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed December 13, 1906. Serial No. 347,676.

To all whom it may concern:

Be it known that I, BYRON B. GOLDSMITH, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Sound-Record Tablets, of which the following is a specification.

My invention has reference to improvements in sound-record tablets, known in the art as "phonograph," "graphophone," and "gramophone" tablets, the object of the invention being the production of such tablets of a new composition of matter which possesses characteristics that particularly adapt the same for the making of sound-record tablets.

Heretofore commercial sound-record tablets have been made primarily of beeswax, afterward of mineral waxes, metallic soaps, hard rubber, celluloid, and shellac, and with all or with most of these substances have been mixed, and particularly with shellac, other substances in a finely-divided state. In these tablets the record-grooves were according to the nature of the material employed, either cut by a suitable recording-style or were produced by transfer pressure from a suitably-prepared matrix. The cutting of a record-groove in record-tablets that are used for reproduction only has become largely obsolete, and it is now almost the universal practice to produce these record-grooves by transfer pressure from a matrix. For this purpose the record material must be moldable when the transfer is made and must then become hard and non-plastic. The materials now used are generally of a character that they become plastic when heated and hard at ordinary temperatures—that is to say, they are thermoplastic. Shellac, with admixtures of a variety of compounding materials, is the material which is most largely used, particularly in sound-record tablets of the gramophone type; but the price of shellac has more than doubled in recent years, and the cost of the tablets has increased in proportion.

My new composition for the manufacture of sound-record tablets consists of casein, either alone or with suitable admixtures, and a number of different methods can be used for working the casein into a mass into which the sound-record groove can be produced by transfer pressure from a suitable matrix. The most primitive method consists in taking the casein, slightly moistened,

and subjecting it to heat and pressure under the matrix. Another method is to treat casein with solutions of borax or alkalies and working up the mass in such shape that the record-groove can be pressed into it by a matrix; but I have discovered a particular method of working casein into a sound-record tablet, which renders the manufacture much easier and the product much better, as will presently appear.

I have found that by mixing certain ingredients with casein I can produce a composition which when heated softens to any desired degree, so that when a tablet is formed of that new composition it will receive a sound-record groove by transfer pressure from a matrix with the greatest ease. I have called these new casein mixtures "thermoplastic casein," and I have given the name "converting agents" to the substances which give the casein the valuable property of thermoplasticity. Some of the agents which I have found to convert casein into a thermoplastic state are alpha-naphthol, beta-naphthol, benzoic acid, carbolic acid, hydrochinon, kresol, pyrocatechin, resorcin, salicylic acid, and urea.

There are other substances which act as converting agents on casein, and I am not limited to the agents which I have enumerated, although these yield good results. The thermoplastic casein can be used for the formation of sound-record tablets in its pure state, and it can be mixed with other materials, such as are used as admixtures to shellac, in the production of gramophone-record tablets. It can be given any desired color, and it can be mixed with shellac.

The tablets may be made flat, disk shape, cylindrical, or of any other desired form, and they can be made all throughout their whole mass of thermoplastic casein, or this material may be applied in a thin layer, either in a fluid or plastic state, upon a base of any kind.

Casein in any of the forms in which I employ the same is much cheaper than shellac or shellac compounds or any other sound-record material known to me.

The degree of hardness attained by the product in the cold state varies with the kind of converting agent employed, and ordinarily the new composition will be softer in the cold state and more plastic when heated when a quantity of converting agent is employed. Liquid converting agents will also ordinarily give a softer product than solid ones, and

when a liquid converting agent is used in sufficient quantity the new compound can be made with any degree of pliability and flexibility in the cold. This same result can
5 be obtained by the use of a solid converting agent with the addition of a liquid which is not antagonistic to the mixture, such as glycerin.

I am thus enabled to vary the hardness
10 and thermoplasticity of the new sound-record material throughout a very wide range by using different converting agents or by employing several converting agents together and in various proportions and by using
15 different amounts of crude casein or casein compound. In this manner I have made converted casein that became plastic by a moderate heat and others that require the heat of steam at eighty pounds pressure to
20 become plastic.

A characteristic of some of the converting agents upon which the continued thermoplastic property of the new composition depends is their tendency to remain in the com-
25 pound and not to volatilize to any marked degree. Altogether the converting agents behave with respect to and act upon the casein in a similar manner as camphor upon nitrocellulose in the formation of celluloid.
30 Nitrocellulose itself is not plastic, but becomes so when mixed with camphor.

In the practical manufacture of my new sound-record material the casein may be united with the converting agent on and be-
35 tween suitably-heated rolls, the same as nitrocellulose and camphor are united in the manufacture of celluloid. Any method, however, will answer by which the casein is brought into intimate contact with the con-
40 verting agent, whether or not heat and pressure be employed.

Instead of using the converting agents in their natural state I can with advantage first dissolve them in alcohol or water or
45 other suitable liquid. A liquid which readily evaporates is advisable.

No definite proportions of the ingredients can be or need be stated, since a wide range of proportions is permissible, depending
50 upon the degree of hardness and thermoplasticity aimed at. One of the numerous practical proportions which I have used and the manner of procedure employed is the following: I have used three pounds of dry
55 casein, one-half pound of beta-naphthol, and one pint of alcohol. The naphthol was first dissolved in the alcohol, and the solution was sprinkled upon the casein so as to thoroughly moisten the same. The mass was then
60 kneaded between moderately-heated rolls until it became uniform throughout. In this condition the mass was then rolled out into sheets or formed into tubes, and these sheets or tubes remained flexible at ordinary
65 temperatures until the alcohol had evapo-

rated, when they became hard at ordinary temperatures, but quite plastic when heated.

It will be readily understood that large quantities of compounding materials or admixtures can be kneaded in with the casein on
70 the rolls, the same as is done in the manufacture of rubber and celluloid. More particularly is it practicable to knead into the mass scraps of waste celluloid, finely-divided horn, rubber, resins, gums, and coloring-matter,
75 and in this manner a great variety of converted-casein compounds can be produced each having a peculiarity of its own. Glycerin may also be mixed into the mass for rendering the product more flexible. The
80 sheets as they come from the mixing-rolls or calenders may with advantage be pressed between heated plates to complete the conversion.

Instead of using casein alone or casein
85 with such admixtures as above broadly indicated for the production of converted casein or converted-casein compounds I may use any of the derivatives of casein known in the arts, such as the compounds of casein, with acids,
90 bases, and salts, and I wish it to be understood that by the term "casein" I mean to include the derivatives of casein, since I have found the latter to act similarly to the pure casein.
95

The thermoplastic casein made as hereinbefore described can be used immediately as the material for a sound-record tablet; but when greater hardness of the tablet is required it is necessary to embody in the mass
100 of the thermoplastic casein such substances as baryta, infusorial earth, powdered glass, or silicates in any other finely-divided form, or metallic oxids, especially the native oxid of iron, or corundum, or carborundum. In
105 short, all the admixtures which are ordinarily used with shellac in the production of gramophone-record tablets may be incorporated in the thermoplastic casein by kneading them, or any of them, into the mass
110 either during the process of conversion or after the conversion.

In the accompanying drawing I have, by way of example, illustrated a sound-record tablet in the form of a disk, which may be
115 made of my improved record material; but the tablet may have any other suitable form and need not be made solidly of the new material, as hereinbefore described. The sound-record groove may be pressed into the mass
120 by a matrix just as it comes from the mixing-rolls, so that the tablet is formed by the same pressure which impresses the sound-groove, or the tablet may be first roughly formed and allowed to harden, and the sound-record
125 may then be impressed at any time thereafter by first heating the blank tablet to render it soft and moldable.

Altogether my new sound-record material may be manipulated and applied like every
130

other thermoplastic material—such, for instance, as shellac and its compounds.

By the term "sound-record tablet" hereinbefore employed I designate not only the
5 tablet with the sound-groove impressed therein, but also the tablet when it is still a blank but otherwise ready to receive a sound-record. Therefore a simple disk or a simple cylinder with no sound-groove im-
10 pressed thereon is understood to be a sound-record tablet if the size and shape of the disk or cylinder or differently-shaped structure is such as adapts the same to receive a sound-groove.

15 Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. A sound-record tablet having a record-surface of casein.

20 2. A sound-record tablet having a record-surface of casein composition.

3. A sound-record tablet having a record-surface of thermoplastic casein, substantially as described.

25 4. A sound-record tablet having a record-surface of a mixture of thermoplastic casein and compounding materials, substantially as described.

30 5. A sound-record tablet having a record-surface composed of casein and beta-naph-

thol or its equivalents, substantially as described.

6. A sound-record tablet having a record-surface composed of casein, beta-naphthol or its equivalents, and compounding materials, 35 substantially as described.

7. A sound-record tablet of casein.

8. A sound-record tablet of casein composition.

9. A sound-record tablet formed of ther- 40 moplastic casein.

10. A sound-record tablet formed of a mixture of thermoplastic casein and compounding materials, substantially as described. 45

11. A sound-record tablet composed of casein and beta-naphthol or its equivalents, substantially as described.

12. A sound-record tablet composed of casein, beta-naphthol or its equivalents and 50 compounding materials, substantially as described.

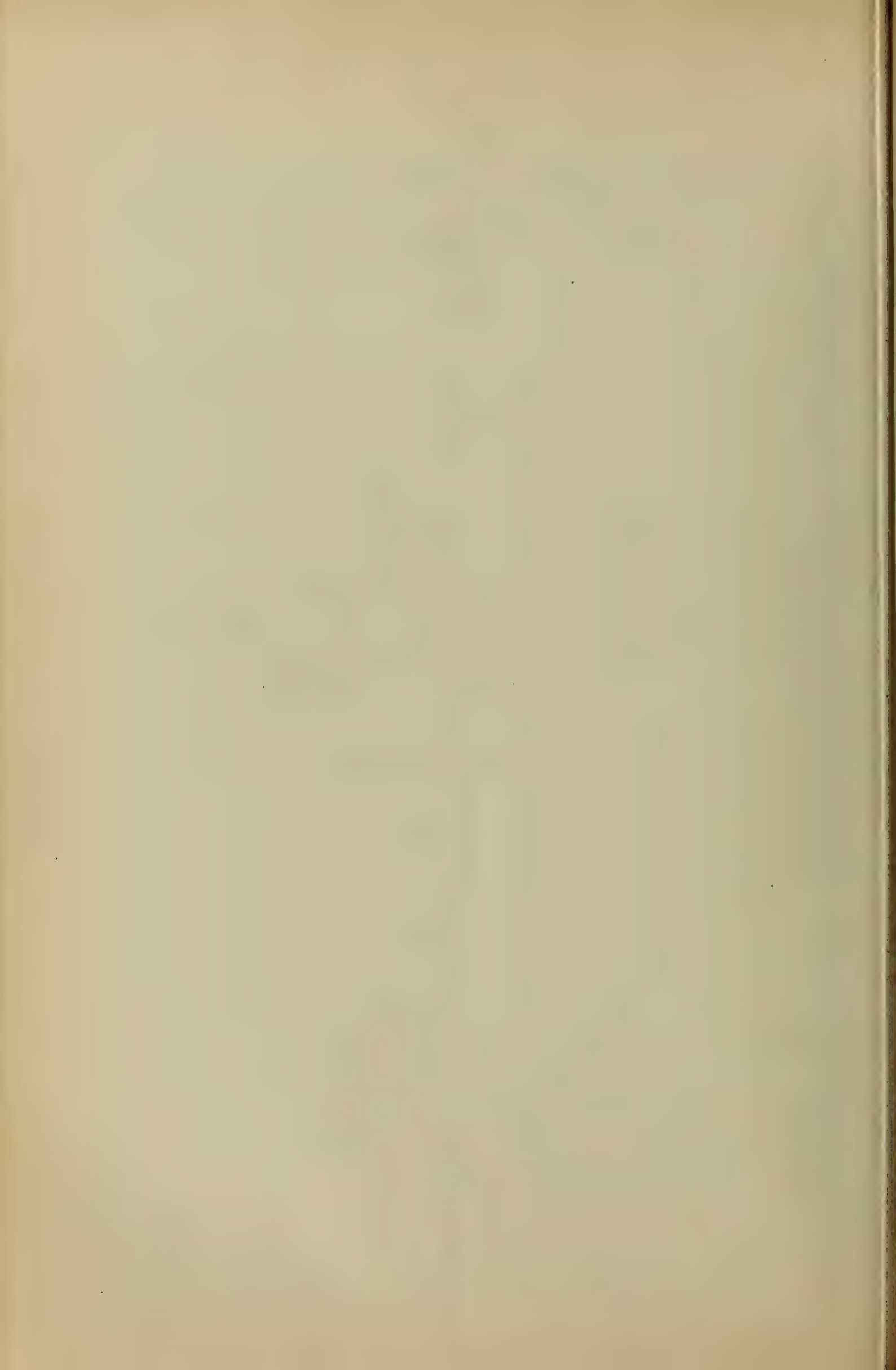
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

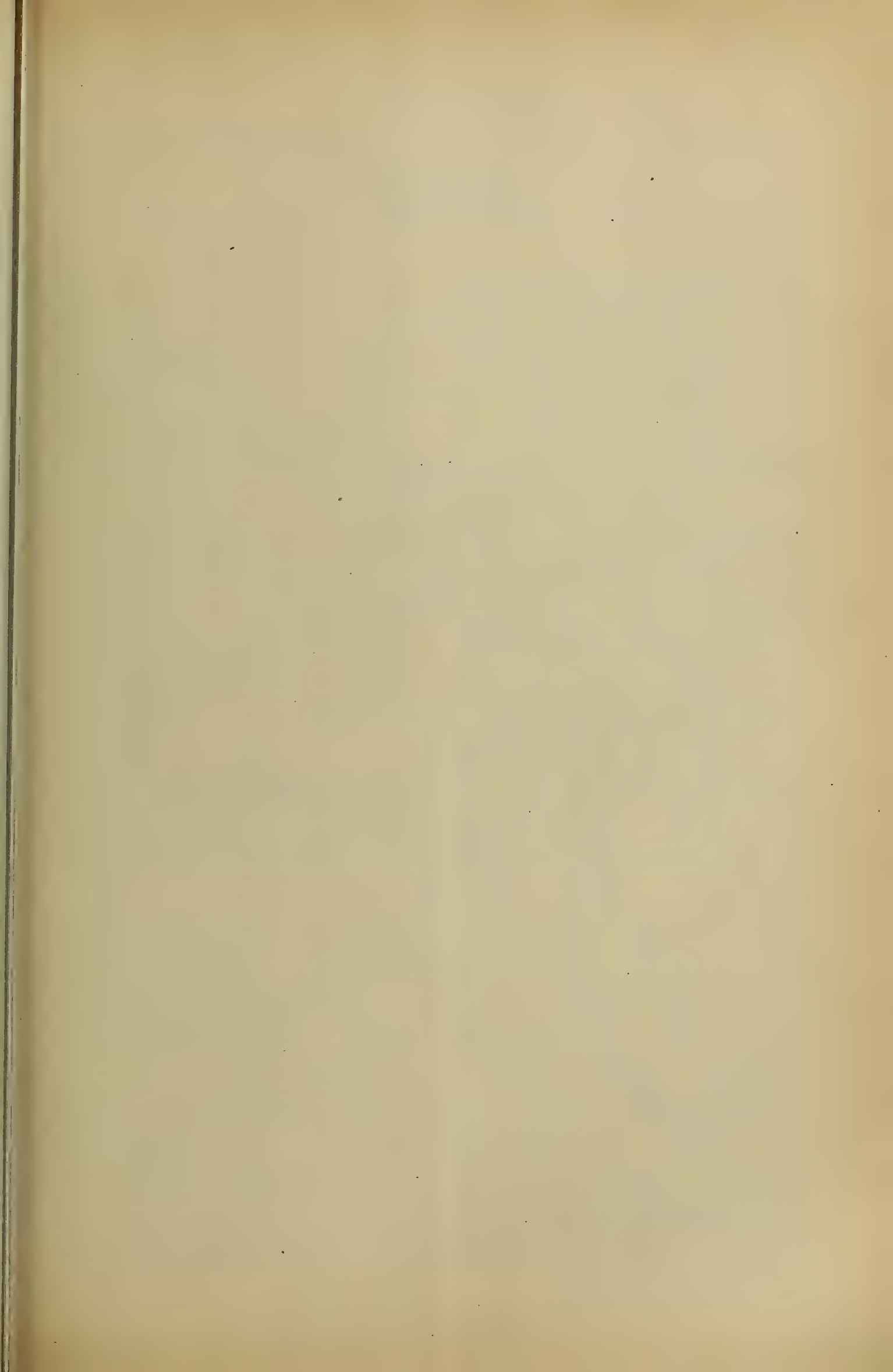
BYRON B. GOLDSMITH.

Witnesses:

G. A. GOLDSMITH,

R. GOLDSMITH.





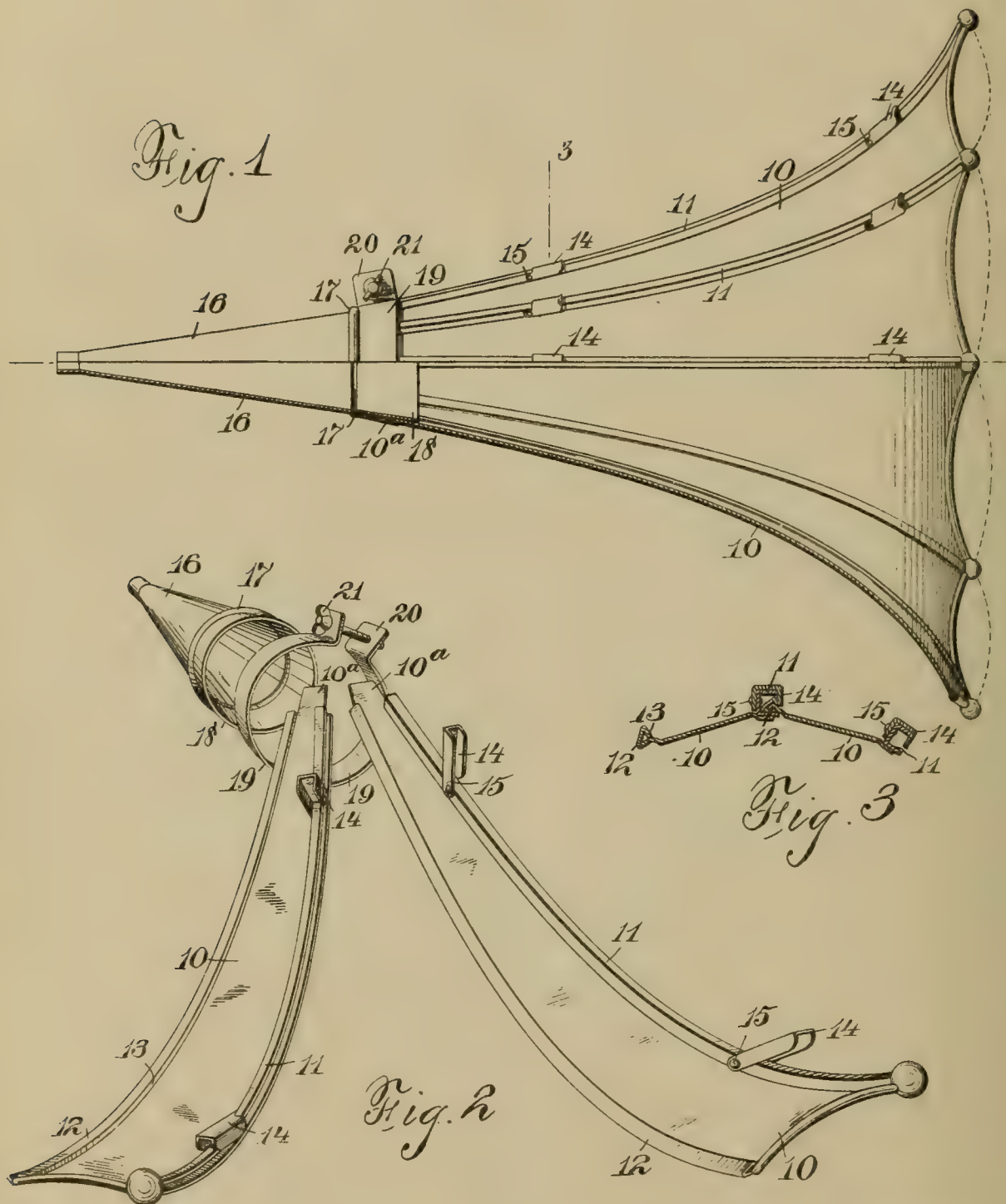
No. 840,967.

PATENTED JAN. 8, 1907.

M. STEINER & M. BRENNER.

AMPLIFYING HORN.

APPLICATION FILED MAY 25, 1906.



WITNESSES:

Ralph Lancaster
E. A. Peck

INVENTORS

Max Steiner
and Mick Brenner
BY

Wm. H. Campfield
ATTORNEY

UNITED STATES PATENT OFFICE.

MAX STEINER AND MICK BRENNER, OF NEWARK, NEW JERSEY.

AMPLIFYING-HORN.

No. 840,967.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed May 25, 1906. Serial No. 318,611.

To all whom it may concern:

Be it known that we, MAX STEINER and MICK BRENNER, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Amplifying-Horns; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention relates to a horn, and more particularly to that class of horns that are known as "amplifying-horns," these being mainly used on talking-machines and as megaphones.

The invention is designed to provide a horn of this class that can be taken apart, the larger end of the horn and the major portion of its length being made of separable sections that will fit one on the other, so as to make a compact package for transportation or storage.

The invention is further designed to provide means for holding these separable sections when they are assembled to form the horn; and a still further object is to provide a means on the smaller end of the horn for holding all parts together, so that the small and large ends are rigidly and securely connected.

Our invention is illustrated in the accompanying drawings, in which—

Figure 1 is a half-elevation and half-section of the horn assembled. Fig. 2 is a perspective view of the elements making up the small ends of the horn and two of the separable sections that constitute the large or the flaring end. Fig. 3 is a section of two of the sections of the horn, this view being taken on line 3 in Fig. 1.

As illustrated, our horn is made up, on the larger end, of the sections 10 that are of a configuration that permits of a series of these sections to be put together to make a horn of the desired shape. Each of these sections on one edge has a channel-shaped rib 11 and on the other edge a turned-over portion 12. The rib 11 is soldered to one edge of a section 10; but it may be otherwise secured, or it might be bent up from the same piece. The rib 12 may be made of any suitable shape, so

long as it will fit into the rib 10, and has the straight rear piece 13, that permits of its being locked in the channel 11 by one edge of the U-shaped clasp 14, these clasps being disposed at suitable intervals on the ribs 10 and pivoted by a suitable pin or rivet 15. This holding means, however, might be changed, as long as the structure was devised to hold the ribs on the adjacent edges of the sections 10 together. These sections when thus assembled are prevented from collapsing or from being separated, and in the small end of these joined sections is forced a conical sleeve 16, that has a peripheral rib 17, and the larger flaring end 18 of which fits up tight inside the flat inner edges or tongues 10^a of the sections 10. Around this joint and having one edge in engagement with the rib 17 and the other edge in contact with the inner ends of the ribs 11 and 12 is the band 19, that is slipped around the horn, and the ends 20 are drawn together by a set-screw or similar regulating device 21.

It will be seen from this description that the small end of the horn is easily packed away—that is, the elements 16 and 19—and the larger part of the horn is made up of separable sections 10 that are duplicates of one another, and these sections can be folded or laid in a pile, and they take up very little room.

The particular kinds of fastening means for the ribs and also for the band 19 can have alternative constructions to perform their functions.

Having thus described our invention, what we claim is—

1. A horn comprising a tapered sleeve at its small end, its large end made up of assembled sections detachably secured together, each section having a flat tongue on its inner end, and a detachable band for covering the tongues and clamping them around and against the tapered sleeve.

2. A horn comprising a tapered sleeve, at its small end, a large end made up of detachable sections, each section having one edge provided with clamps secured thereto and its opposed edge adapted to be clamped, whereby the adjacent sections are secured together, and means for clamping the assembled sections on the tapered sleeve.

3. A horn comprising a tapered sleeve at its inner end, a large end composed of separable sections, each section having a hollow rib on one edge, and a rib on its other edge to

enter the hollow rib on the adjacent section, means on the ribs for fastening the sections together, and means for securing the assembled sections on the large end of the tapered sleeve.

5 4. In a horn comprising a tapered sleeve at its smaller end, the larger end of the horn being made up of separable sections, each section having a hollow rib on one edge, and having on its other edge a rib to enter the hollow
10 rib on the adjacent section, clips to go over the ribs to fasten them together, the inner ends of the assembled sections fitting on the large end of the tapered sleeve, and means
15 encircling the ends of the sections to fasten the parts together.

20 5. A horn comprising a series of separable sections, means for detachably securing the sections together, a tapered sleeve on the small end of the horn arranged to be embraced by the inner ends of the assembled

sections, a peripheral rib on the tapered sleeve, ribs on the adjacent edges of the assembled sections, a peripheral band between the rib of the sleeve and the ends of the ribs
25 on the sections, and means for drawing the ends of the bands together.

6. In a horn made up of detachable sections, each section comprising a body portion, a hollow rib on one edge, a rib on the opposed edge of the section to fit the first-mentioned rib, and pivoted clips on the hollow
30 ribs and arranged, when in place, to cover the open side of the hollow rib.

In testimony that we claim the foregoing
35 we have hereunto set our hands this 23d day of May, 1906.

MAX STEINER.
MICK BRENNER.

Witnesses:

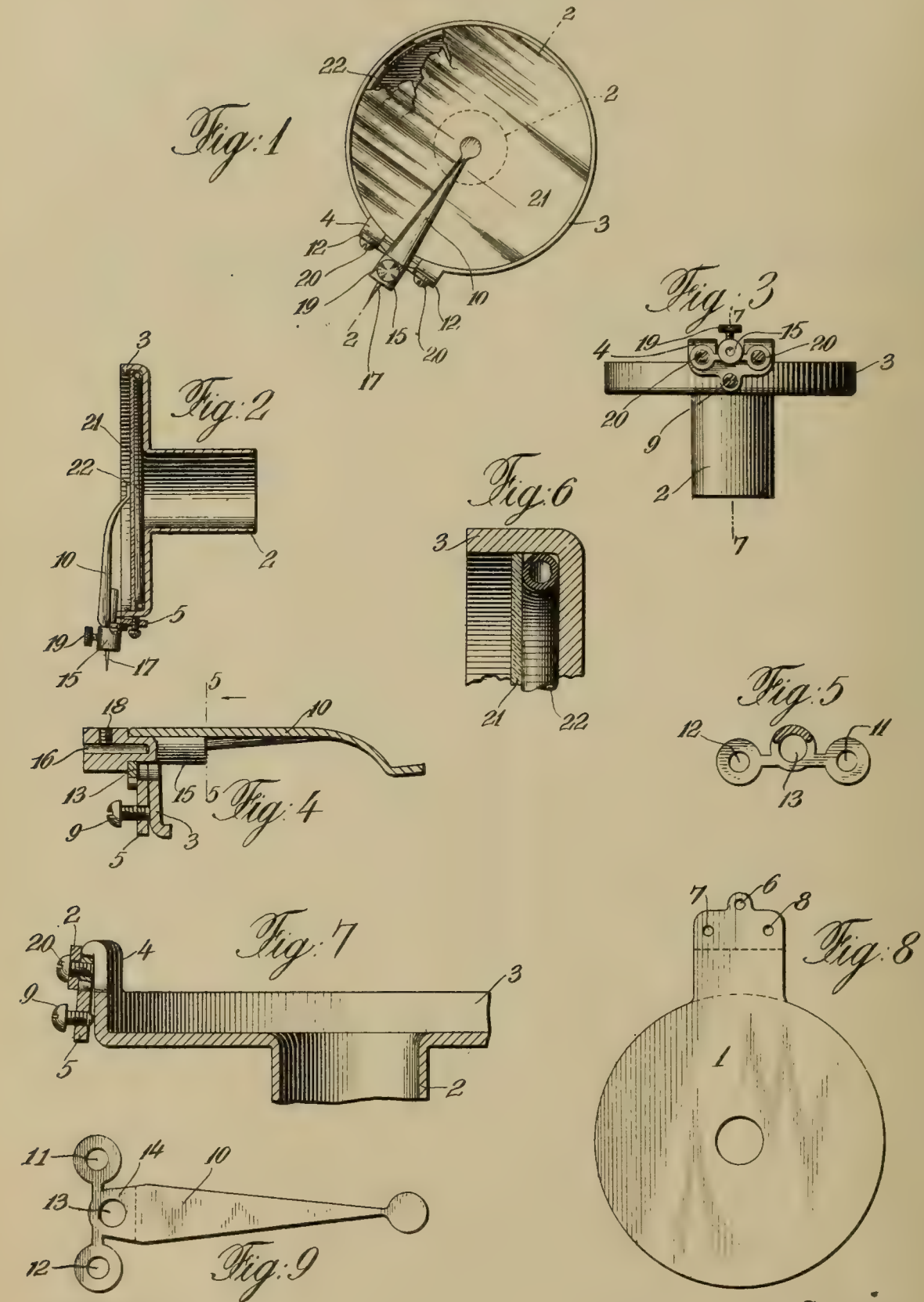
E. A. PELL,
WM. H. CAMFIELD.

No. 840,974.

PATENTED JAN. 8, 1907.

L. P. VALIQUET.
SOUND BOX.

APPLICATION FILED APR. 13, 1906.



Witnesses
J. M. O'Connor
M. G. Crawford

Inventor
Louis P. Valiquet
By his Attorney
A. B. Smith

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEWARK, NEW JERSEY.

SOUND-BOX.

No. 840,974.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed April 13, 1906. Serial No. 311,598.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

My invention relates to talking-machines generally, and more specifically consists of a cheap and easily adjustable form of sound-box for use therein.

The purpose of my invention is to produce a sound-box out of the smallest possible number of pieces of material by stamping and bending same into shape and at the same time produce a construction in which the stylus-arm may be easily and permanently adjusted so as to leave the diaphragm free to vibrate under the best possible conditions.

The best form of apparatus embodying my invention at present known to me is shown in the accompanying sheet of drawings, in which—

Figure 1 is a front view of a sound-box comprising my invention with part of the diaphragm broken away. Fig. 2 is a cross-section on line 2 2 of Fig. 1. Fig. 3 is a side elevation of a sound-box looking along the axis of the stylus-holding arm. Fig. 4 is a detail sectional view of the stylus-holding arm, needle-holder, and lug of the diaphragm-holder, to which it is attached. Fig. 5 is a cross-section of the stylus-arm taken on line 5 5 of Fig. 4. Fig. 6 is a detail sectional view showing the diaphragm and dampening-ring assembled in the diaphragm-holder. Fig. 7 is a detail sectional view of the diaphragm-holder and stylus-holding-arm lug in position thereon, said section being taken on broken line 7 7 of Fig. 3. Fig. 8 is a view of the blank out of which the diaphragm-holder is stamped, and Fig. 9 is a view of the blank out of which the stylus-holding arm and its attaching-lugs are stamped.

Throughout the drawings like reference-figures indicate like parts.

The blank 1 (shown in Fig. 8) is stamped or drawn so as to form the sound-conveying tube 2, the circumferential rim 3, and the stylus-holding lug 4, projecting from said rim. (See Fig. 7.) This stylus-holding lug has a portion 5, in which screw-holes 6, 7, and 8 are punched and stamped, which is bent outwardly and downwardly, as shown in Figs. 3 and 7 and in which is mounted the adjusting-

screw 9, which bears upon the main portion or rim 3 of the diaphragm-holder.

The stylus-holding arm is formed of the blank 10, which has the laterally-extending perforated lugs 11 and 12 and the perforation 13, all formed on the part 14, which is bent downwardly along the dotted line shown in Fig. 9, so as to bring such lugs at right angles to the main body of the stylus-holding arm and the axes of the perforations 11, 12, and 13 in line with the main portion of said arm. Into the perforation 13 is forced a needle-holder 15, which is a cast or otherwise formed body of metal having a perforation 16 for receipt of the needle or stylus 17, and a threaded opening 18, in which the clamping-screw 19 may be inserted. The needle-holder thus formed, as shown in Fig. 4, is mounted on the lug 5 by means of clamping-screws 20, passing through the perforated lugs 11 and 12 and into the threaded openings 7 and 8 in said lug. (See Figs. 3 and 7.)

21 represents any suitable diaphragm, and 22 a rubber tube or other gasket placed under the same in the usual way to serve as a dampening-ring.

Such being the construction of my invention, the mode of operation is as follows: The parts being assembled, as shown in Figs. 1, 2, 3, and 4, the stylus-holding arm may have its inner end attached to the diaphragm 21 by any convenient body of cement in the usual way, being properly adjusted thereto by manipulating the adjusting-screw 9, which bends the portion 5 of the supporting-lug 4 in or out and varies the normal position of the stylus-holder accordingly.

The advantages of my invention comprise the cheapness of construction which results from stamping or forming the entire apparatus out of only three parts of metal, the non-liability of same falling apart or out of adjustment by reason of the few fastenings required, the ease of adjustment and the high quality of sound reproduction which results from faithful transmission of all vibrations through the practically integral structure which connects the stylus with the diaphragm and from the absence of any rattling or other disturbing noises which tend to be produced by joints, especially when the parts so connected together come loose at such joints.

It is evident of course that various changes could be made in the shape and configuration

of the parts disclosed in the drawings without departing from the spirit and scope of my invention so long as the principle of construction therein described is preserved.

5 Having therefore described my invention, I claim—

1. In a reproducer for talking-machines, a diaphragm-holder, sound-conveying tube and stylus-holding lug all stamped up out of one
10 piece of metal, said lug being bent outward and downward through an angle of about one hundred and eighty degrees to form a tension-adjusting member.

2. In a reproducer for talking-machines, a
15 diaphragm-holder, sound-conveying tube and stylus-holding lug all stamped up out of one piece of metal, said lug being bent outward and downward to form a tension-adjusting member and combined with an adjusting-
20 screw mounted in one portion of said lug and bearing on the other portion.

3. In a reproducer for talking-machines, a stylus-holding arm having perforated lugs bent at right angles to the arm for attachment to the diaphragm-holder, the arm and
25 lugs being all stamped out of one piece of metal.

4. In a reproducer for talking-machines, a stylus-holding arm having perforated lugs
30 bent at right angles to the arm for attachment to the diaphragm-holder, and a central perforation for the stylus, the arm and lugs being all stamped out of one piece of metal.

5. In a reproducer for talking-machines, a
35 stylus-holding arm having perforated lugs bent at right angles to the arm for attachment to the diaphragm-holder, and a central perforation for the stylus, combined with a needle-holder inserted in said central perforation.
40

6. In a reproducer for talking-machines, a diaphragm-holder having an outwardly and downwardly bent lug, a stylus-holding arm

fastened thereto and means for adjusting the position of said downwardly-bent portion of
45 the lug.

7. In a reproducer for talking-machines, a diaphragm-holder having an outwardly and downwardly bent lug, a stylus-holding arm fastened thereto and means for adjusting the
50 position of said downwardly-bent portion of the lug, said means comprising a set-screw mounted in the downwardly-bent portion of the lug and bearing on the diaphragm-holder

8. In a reproducer for talking-machines, a
55 diaphragm-holder having an outwardly and downwardly bent lug, a stylus-holding arm fastened thereto by means of perforated lugs on said stylus-carrying arm bent at right angles thereto, all in combination. 60

9. In a reproducer for talking-machines, a diaphragm-holder having an outwardly and downwardly bent lug, a stylus-holding-arm fastened thereto by means of perforated lugs on said stylus-carrying arm bent at right
65 angles thereto, all in combination with a needle-holder inserted in a central perforation in the bent portion of the stylus-carrying arm.

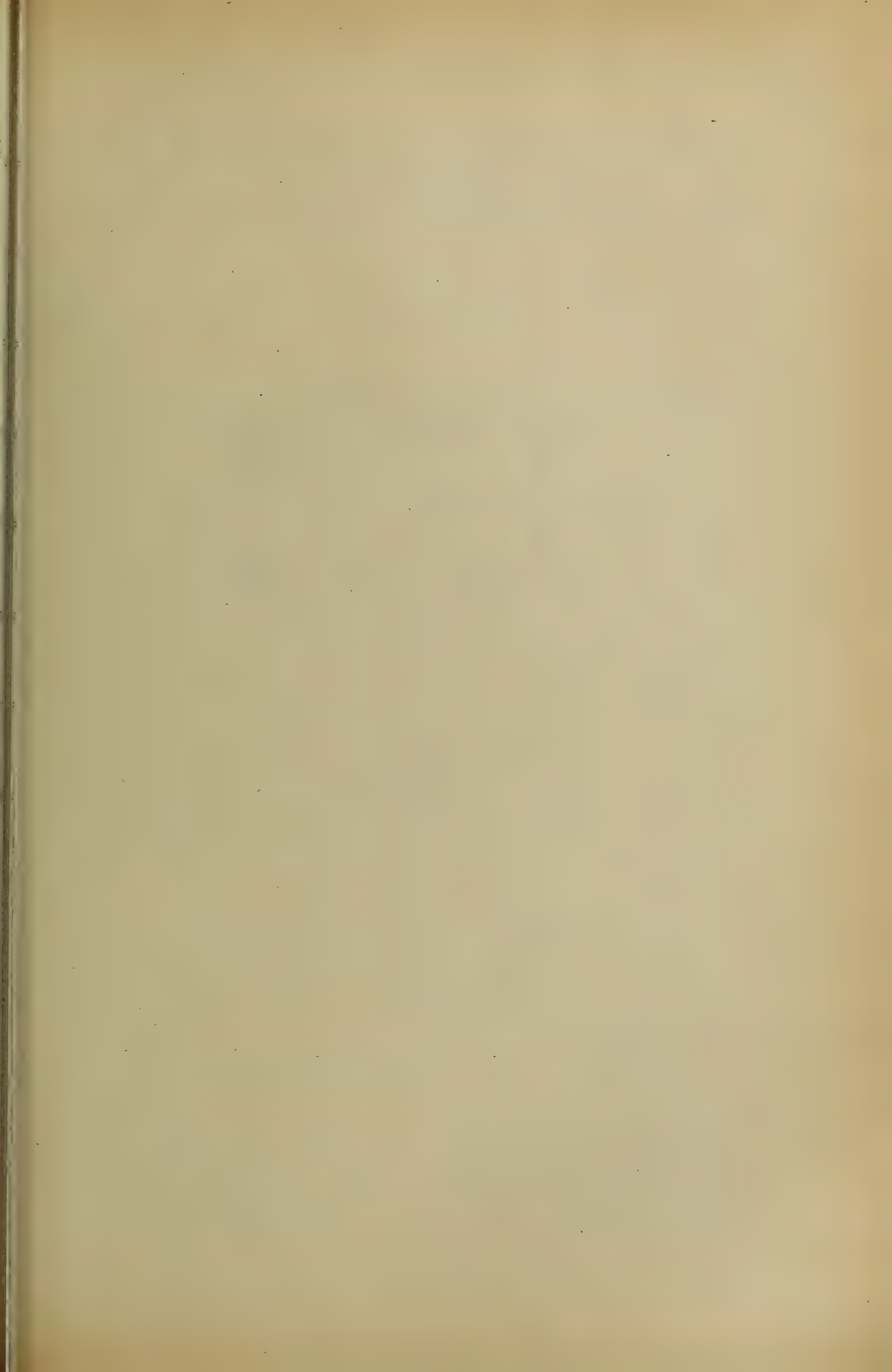
10. In a reproducer for talking-machines, a
70 diaphragm-holder having an outwardly and downwardly bent lug, a stylus-holding arm fastened thereto by means of perforated lugs on said stylus-carrying arm bent at right angles thereto, all in combination with a
75 needle-holder inserted in a central perforation in the bent portion of the stylus-carrying arm and means for adjusting the position of the downwardly-bent portion of the diaphragm-holder. 80

Signed at New York, N. Y., this 31st day of March, 1906.

LOUIS P. VALIQUET.

Witnesses:

FRANK O'CONNOR,
M. G. CRAWFORD.



No. 841,727.

PATENTED JAN. 22, 1907.

C. C. SHIGLEY.
MANDREL FOR PHONOGRAPHIC RECORDS.
APPLICATION FILED FEB. 17, 1906.

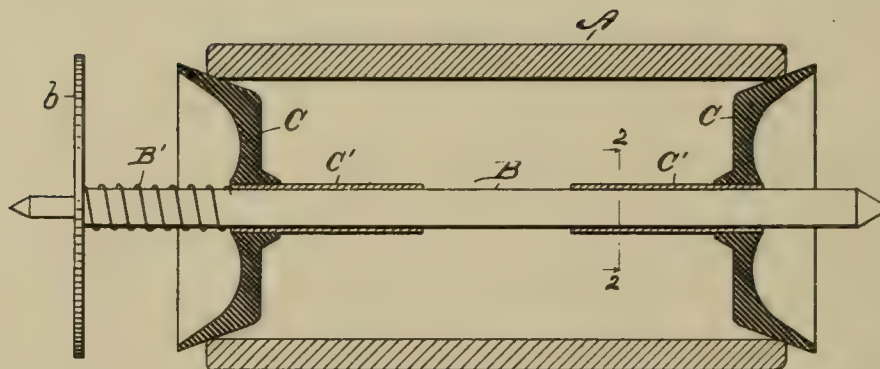


Fig 1

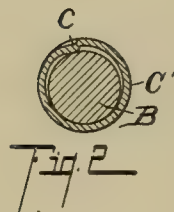


Fig. 2

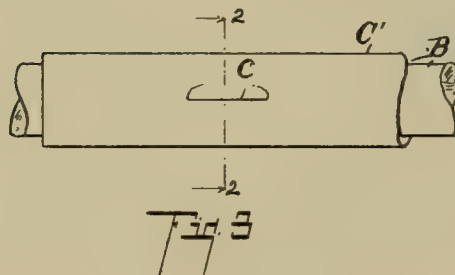


Fig 3

Witnesses:

W. L. Mergerson
Ethel A. Sellen

Inventor,

Cyrus C. Shigley
By Chappell Earl
Att'y's

UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY, OF HART, MICHIGAN, ASSIGNOR TO THE MULTI
PHONOGRAPH COMPANY INCORPORATED, OF GRAND RAPIDS,
MICHIGAN.

MANDREL FOR PHONOGRAPHIC RECORDS.

No. 841,727.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed February 17, 1905. Serial No. 246,147.

To all whom it may concern:

Be it known that I, CYRUS C. SHIGLEY, a citizen of the United States, residing at the village of Hart, in the county of Oceana and State of Michigan, have invented certain new and useful Improvements in Mandrels for Phonographic Records, of which the following is a specification.

This invention relates to improvements in mandrels for phonographic records.

My improved mandrel for phonographic records is particularly adapted for use in phonographs such as illustrated and described in United States Letters Patent No. 773,164, issued to me on October 25, 1904, although it is desirable for use in other relations.

The objects of my invention are, first, to provide an improved mandrel for phonographic records by which the mandrel is properly centered; second, to provide an improved mandrel for phonographic records by which the mandrel may be readily adjusted longitudinally to bring the same into proper relation to the phonographic mechanism; third, to provide an improved mandrel for phonographic records by which the record is yieldingly supported to allow the expansion or contraction thereof under varying temperatures.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central longitudinal view of my improved mandrel for phonographic records with the record in position thereon, the mandrel-shaft B, spring B', and friction-wheel *b* being shown in full lines. Fig. 2 is an enlarged cross-sectional view taken on a line corresponding to line 2 2 of Figs. 1 and 3. Fig. 3 is an enlarged detail view showing the manner of securing the head C upon the shaft.

In the drawings similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the mandrel-shaft B is provided with a suitable bearing-pivot at each end. The shaft is provided with a disk-like friction-wheel *b*. On the shaft B are inwardly-facing conical heads C. These heads are mounted upon sleeves C', adapted to receive the mandrel-shaft B. The inner head is held yieldingly outward by the coiled spring B', arranged between it and the friction-wheel *b*, as clearly appears from the drawings. The outer head C is adjustably secured to the shaft by friction. This is preferably accomplished by indenting the carrying-sleeve of the head, as at *c*.

When it is desired to place a record, as A, upon the mandrel, the outer head is removed and the record placed in position. The outer head is then adjusted upon the mandrel to the proper point to bring the record into proper relation longitudinally to the phonographic mechanism. The inner head is forced into engagement with the inner end of the record-roll by the spring B'. Owing to the conical form of the heads, the record-roll is automatically centered in relation to the mandrel-shaft, the record-rolls being held by the conical or tapered heads wedging into the same. The inner head readily yields to compensate for the expansion or contraction of the record-roll during changes of temperature, so that the record-roll is not loosened by expansion and does not become contracted so as to cause injury thereto or to prevent its ready removal, as is sometimes the case where solid mandrels are used.

I have shown and described a mandrel-shaft with a friction-wheel thereon such as is particularly adapted for use in my improved phonograph illustrated in my patent heretofore referred to. It is evident, however, that this may be varied to meet particular requirements. I have illustrated and described my improved mandrel for phonographic records in detail in the form preferred by me, although I am aware that it is capable of considerable variation in structural details without departing from my invention.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a shaft having a friction-wheel thereon; a pair of inwardly-facing conical heads; carrying-sleeves for said heads adapted to receive said shaft; a coiled spring arranged on said shaft between said friction-wheel and the inner head, adapted to hold the inner head yieldingly outward; and an indentation on the carrying-sleeve of the outer head adapted to hold said sleeve in frictional engagement with the said shaft, for the purpose specified.

2. The combination of a shaft; a pair of inwardly-facing conical heads; carrying-sleeves for said heads adapted to receive said shaft; a spring adapted to hold one of the heads yieldingly toward the other; and an indentation in the carrying-sleeve of the other head adapted to hold said sleeve in frictional engagement with the said shaft, for the purpose specified.

3. The combination of a shaft having a friction-wheel thereon; a pair of inwardly-facing conical heads; carrying-sleeves for said heads adapted to receive said shaft; and a coiled spring arranged on said shaft between said friction-wheel and the inner head, adapted to hold the inner head yieldingly outward, for the purpose specified.

4. In a mandrel for phonographic records, the combination of a shaft; a pair of inwardly-facing conical heads sleeved upon said shaft; means for holding one of said heads yieldingly in position; and means for holding the other of said heads in frictional engagement with said shaft, for the purpose specified.

5. The combination of a shaft; a pair of inwardly-facing conical heads; carrying-sleeves for said heads adapted to receive said shaft; a spring adapted to hold one of the heads yieldingly toward the other, the sleeve of the other of the heads having a frictional engagement with the said shaft, for the purpose specified.

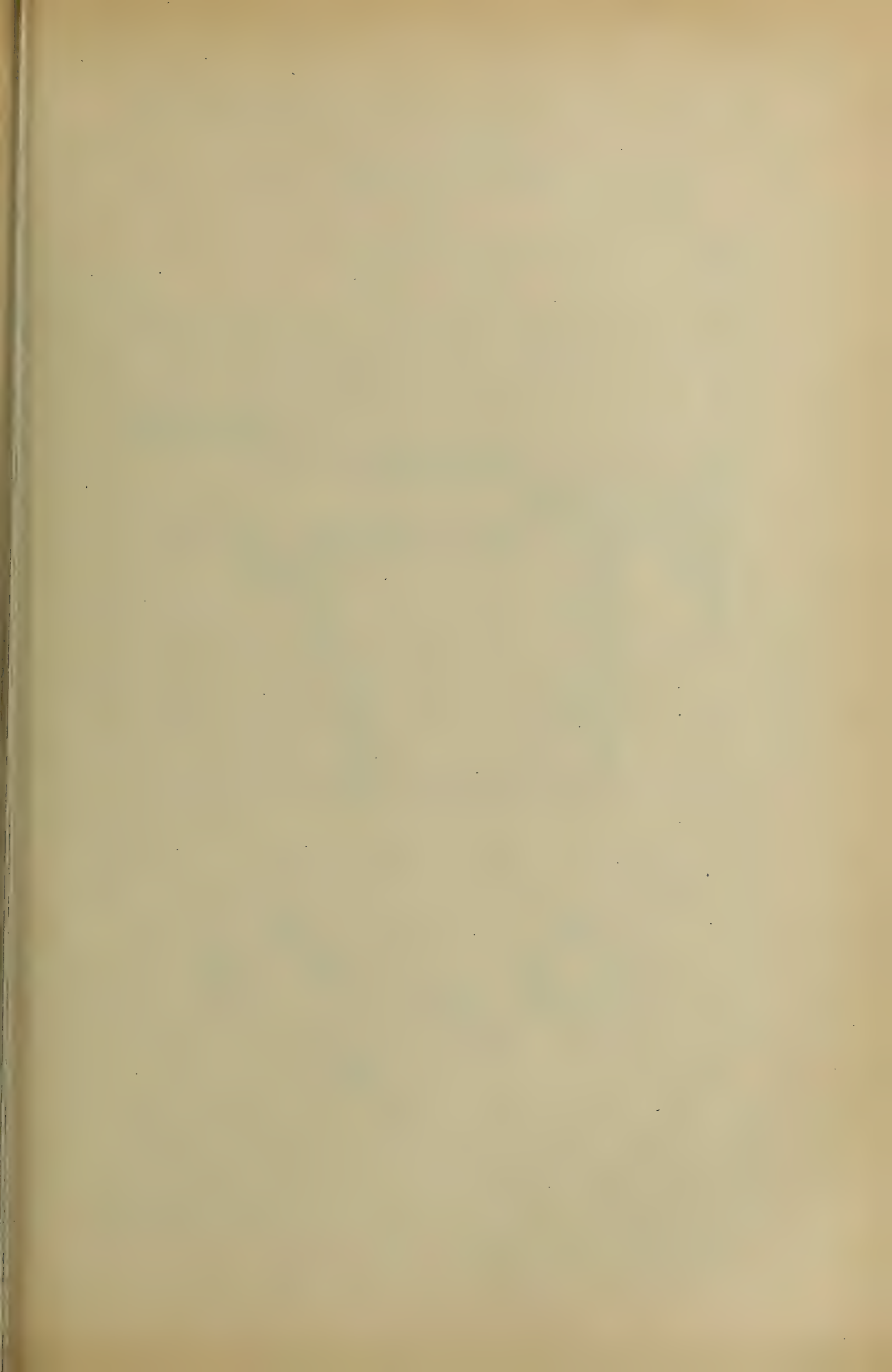
6. In a mandrel for phonographic records, the combination of a shaft; a pair of inwardly-facing conical heads of uniform taper slidably mounted on said shaft; means for retaining one of said heads in its adjusted position on said shaft; and a spring for holding the other head yieldingly in position, for the purpose specified.

In witness whereof I have hereunto set my hand and seal in presence of two witnesses.

CYRUS C. SHIGLEY. [L. S.]

Witnesses:

ESTHER E. ORTH,
GERRIT VANDERBEEK.



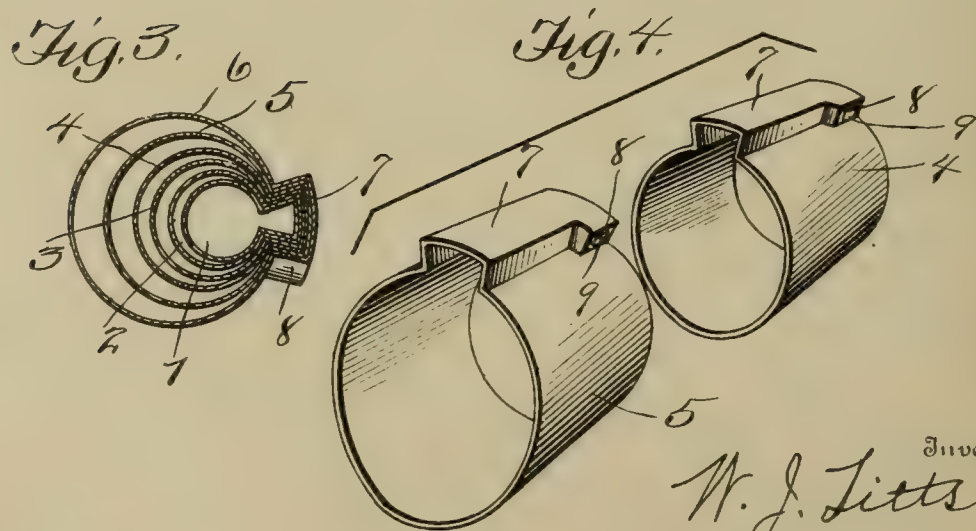
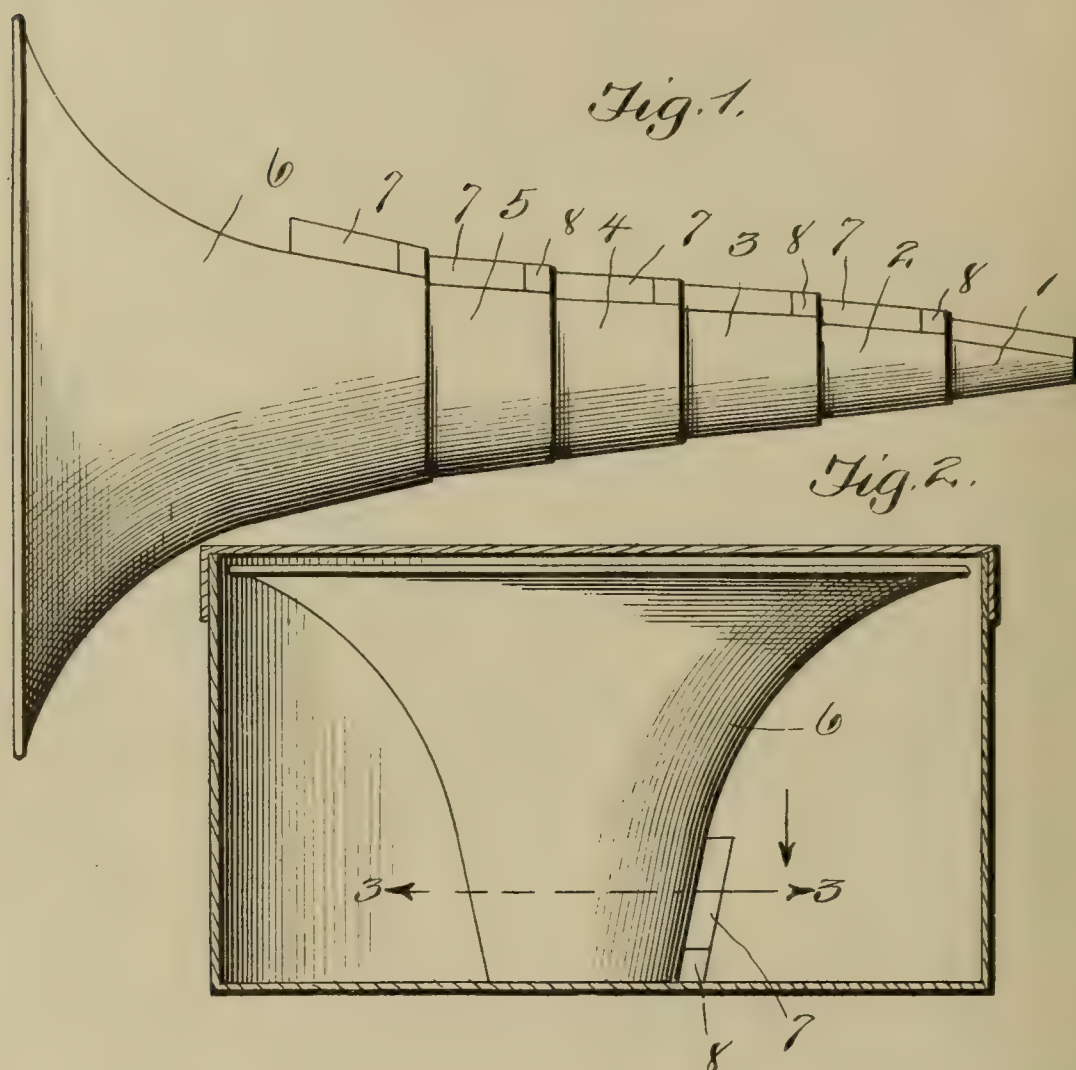
No. 841,795.

PATENTED JAN. 22, 1907.

W. J. LITTS.

DELIVERING HORN FOR TALKING MACHINES.

APPLICATION FILED AUG. 22, 1905.



Witnesses

R. A. Baywell.
H. Welsh

By

Inventor
W. J. Litts
Swift & Co.,
His Attorneys

UNITED STATES PATENT OFFICE.

WILLIS J. LITTS, OF JAYNESVILLE, WISCONSIN.

DELIVERING-HORN FOR TALKING-MACHINES.

No. 841,795.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed August 22, 1905. Serial No. 275,268.

To all whom it may concern:

Be it known that I, WILLIS J. LITTS, a citizen of the United States, residing at Jaynesville, in the county of Rock and State of Wisconsin, have invented a new and useful Delivering-Horn for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to talking-machines, and more particularly to a collapsible delivering-horn composed of a series of sections and having novel means for holding each section of the series in locked relation when the same is collapsed and packed within a metallic tube for shipment.

The invention also comprises novel means, so that when said delivering-horn is extended and also attached to a talking-machine the same may be held locked in said extended position.

This invention is a very efficient device and may be manufactured with but little expense and sold very reasonably to the trade.

The invention comprises other and further objects, which will be hereinafter more fully described and then specifically defined in the appended claims.

My invention is illustrated in the accompanying drawings, which, with the figures of reference marked thereon, form a part of my application, and in which—

Figure 1 is a side elevation of the improved horn. Fig. 2 is a side view of the horn, showing the same collapsed and packed in a case, the latter being shown in section. Fig. 3 is a sectional view on line 3 3 of Fig. 2. Fig. 4 is a detail view of two sections of the horn, showing the same ready to be assembled.

Referring more specifically to the accompanying drawings by reference-numerals, 1, 2, 3, 4, 5, and 6 designate, respectively, each section which comprise the delivery-horn, each section being provided with a suitable longitudinal dovetailed depression 7, which will act as a tongue or groove for each adjacent section when the same is extended or collapsed. To enable the sections to be locked when the horn is collapsed, the said depressions are each provided at the end thereof with a cammed offset 8, serving as a stop, and having a depression 9, which is adapted to engage a like depression of the ad-

jacent section. This construction is for the purpose of allowing the delivery-horn to be firmly locked when desired.

In Fig. 4 of the drawings has been shown two sections of the horn adapted and ready to be assembled. It is obvious that the large end of the smaller section 4 is larger than the small end of the larger section 5, and it is equally obvious that the offset 8 upon the dovetailed depression of the smaller section would prevent the latter from being connected with the larger section by inserting it at the large end of the latter; but it has been found that the smaller section may be readily compressed and the larger section correspondingly expanded sufficiently to permit them to be assembled by inserting the large end of the smaller section into the small end of the larger section, said sections being usually and preferably constructed of sheet metal sufficiently resilient for the purpose. When all the sections of the horn have been thus assembled, the dovetailed members constitute guides or slides that enable the horn to be readily collapsed, as shown in Figs. 2 and 3, and which being in constant engagement prevent the several sections from rattling or shaking, extension of the horn being prevented by the interlocking depressions 9 until sufficient force is exerted manually to disengage said depressions.

From the foregoing it will be observed that a very efficient and inexpensive device is provided whereby a delivery-horn may be collapsed and packed within a metallic tube for the purpose of shipping the same to any destination.

Of course it is distinctly understood that various changes can be made in the details of construction and combinations of parts other than those illustrated in the accompanying drawings without in any way departing from the spirit and scope of the invention.

What I claim is—

1. A collapsible horn for talking-machines composed of a plurality of sections having interengaging dovetailed depressions whereby said sections are held in close engagement when the horn is collapsed.

2. A collapsible horn for talking-machines composed of a plurality of sections having interengaging dovetailed depressions forming tongue-and-groove connections for adjacent sections; said depressions being provided with terminal offsets forming stops.

3. A collapsible horn for talking-machines
composed of a plurality of sections having in-
terengaging dovetailed depressions forming
tongue-and-groove connections for adjacent
5 sections; said depressions being provided
with terminal offsets forming stops, said off-
sets being provided with depressions or in-
dentations adapted to interlock and to secure

the sections of the horn against extending
when collapsed. 10

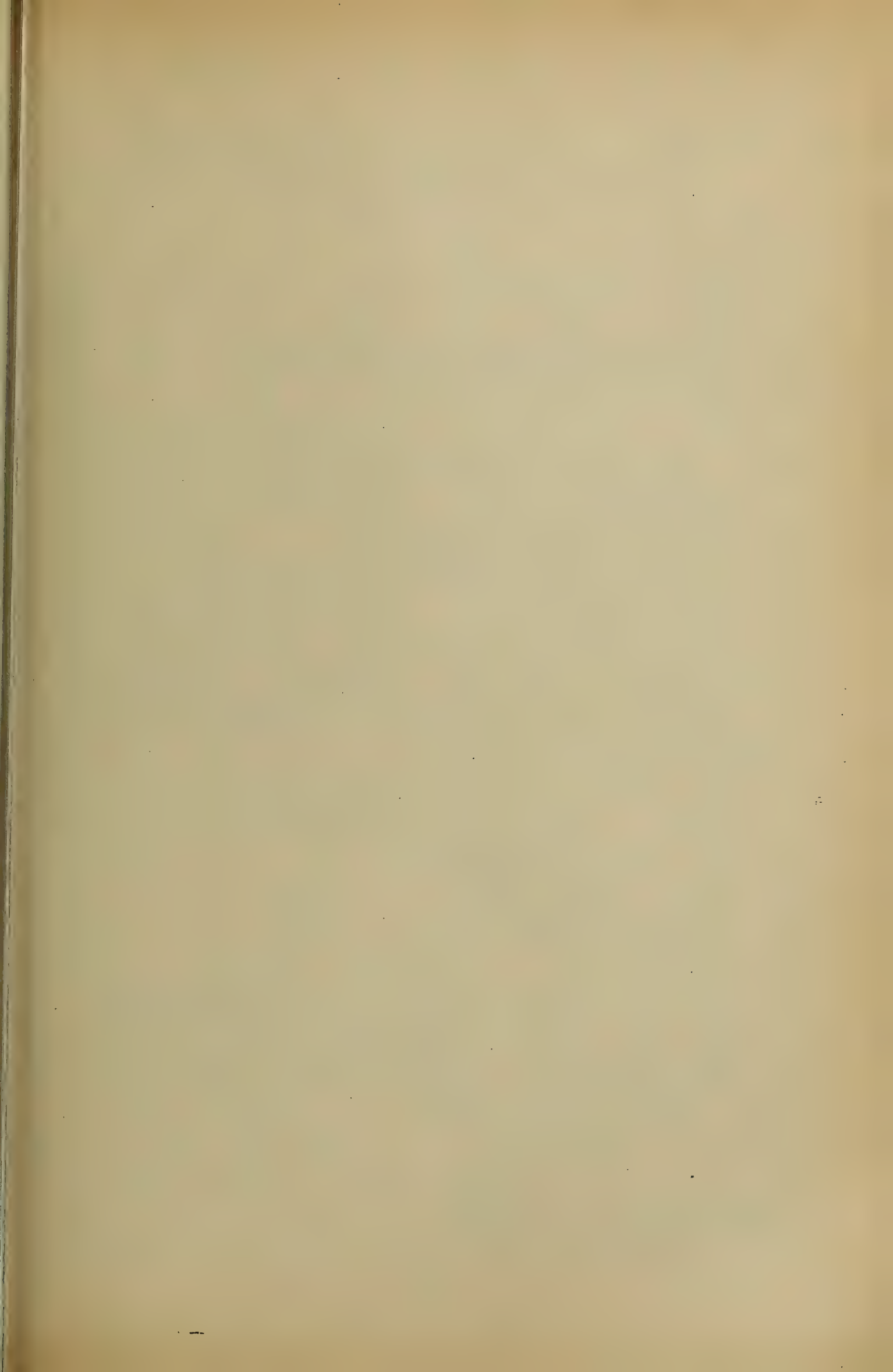
In testimony whereof I have hereto affixed
my signature in the presence of two witnesses.

WILLIS J. LITTS.

Witnesses

CORA R. LITTS,

FANNIE M. LITTS.



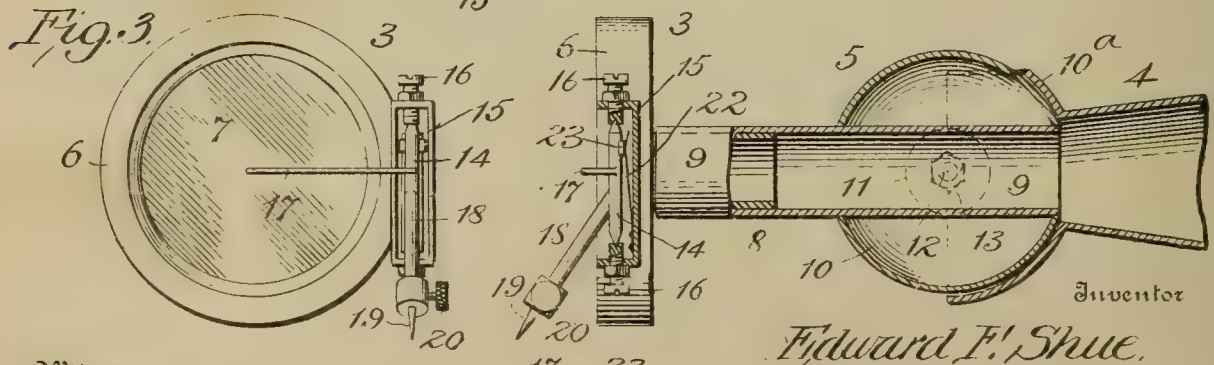
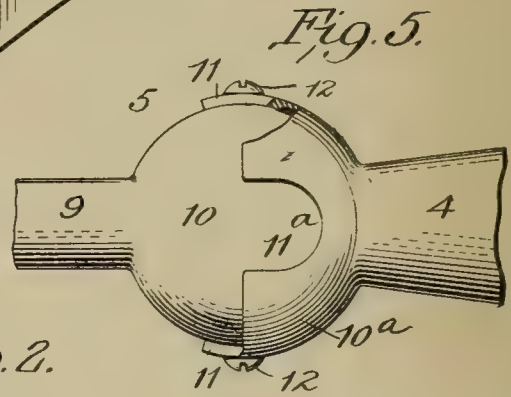
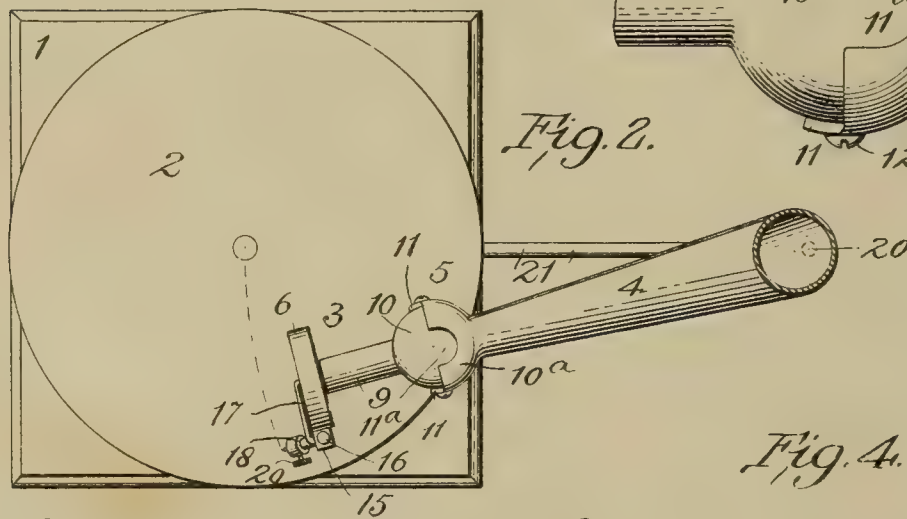
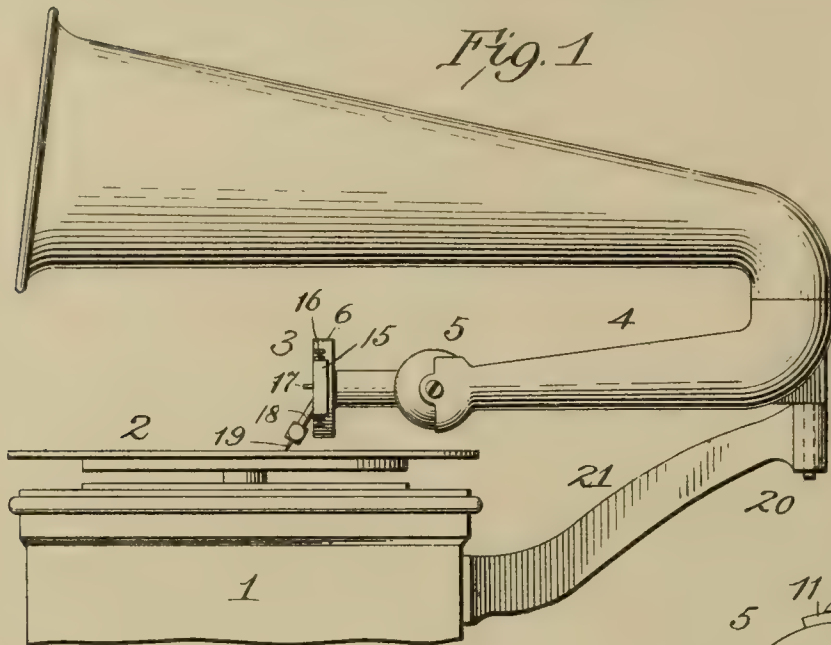
No. 842,028.

PATENTED JAN. 22, 1907.

E. F. SHUE.

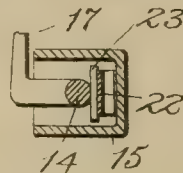
SOUND RECORDING AND REPRODUCING MECHANISM.

APPLICATION FILED SEPT. 18, 1905.



Witnesses
W. B. Burdick
O. W. Holmes

Fig. 6.



Inventor
Edward F. Shue.

By Sidney P. Hoelingsworth

Attorney

UNITED STATES PATENT OFFICE.

EDWARD F. SHUE, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND RECORDING AND REPRODUCING MECHANISM.

No. 842,028.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed September 18, 1905. Serial No. 278,968.

To all whom it may concern:

Be it known that I, EDWARD F. SHUE, a citizen of the United States, residing at Washington, District of Columbia, have invented new and useful Improvements in Sound Recording and Reproducing Mechanisms, of which the following is a specification.

This invention relates to talking-machines, more particularly to that type in which a flat disk is employed for receiving a record in the form of a laterally wavy spiral groove of uniform depth cut into the disk by a stylus operated by a vibrating diaphragm.

The object of the invention is to improve the reproduction of recorded sound by providing suitable means of simple and positive construction attached to the diaphragm of a talking-machine which will cause the recording or transcribing stylus to travel in a direction at a right angle to the vibratory movement of the diaphragm and with a shorter amplitude of vibration. With this construction is combined a straight uninterrupted passage for the sound-waves from the diaphragm for a sufficient distance to prevent them from being broken or muffled before they are bent out of their course.

The invention further consists in the construction, combination, and arrangement of parts, such as will be fully described hereinafter and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a portion of a talking-machine with my invention applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is a front view of the sound-box and recording and reproducing mechanism on enlarged scale. Fig. 4 is a side view of the same, partly in section. Fig. 5 is a plan view of a detail of the invention. Fig. 6 is a sectional view on the line *a a* of Fig. 4.

The numeral 1 indicates the usual box or case, in which is placed the operating mechanism for rotating the record-disk 2. The recording and reproducing mechanism is indicated at 3, attached to the horn 4 or other sound-receiver by means of a ball-joint 5.

The recording and reproducing mechanism 3 comprises a sound-box 6 of the usual cylindrical form, carrying a vibratory diaphragm 7, and a tube 8, projecting centrally from the rear of the sound-box in a straight line and opening thereinto behind the diaphragm.

On one side of the sound-box 6 and sub-

stantially in the plane of the diaphragm 7 is journaled a vertical pivot or shaft 14, preferably contained within a casing 15. The ends of said pivot are pointed and rest in sockets 60 formed in the ends of adjusting-screws 16, passing through the top and bottom of the casing 15. In place of the casing lugs may project from the side of the sound-box to receive the screws. Secured to the vertical 65 pivot 14 is a stylus-lever 25, one arm 17 extending horizontally in front of the diaphragm 7 and attached thereto at its center and so shaped that it will pass around the edge of the sound-box without touching it. 70 A second or stylus arm 18 projects downwardly and forwardly at an angle to said pivot in the direction of rotation of the record-disk and forms a right angle with the arm 17 when seen in plan. The stylus-arm 75 18 carries a stylus 19, adjustable within said arm 18 and secured thereto by a thumb-screw 20. The stylus-arm 18 and stylus 19 are in the same vertical plane as the pivot 14, but at an angle thereto, as clearly illustrated 80 in Figs. 1 and 4. As thus arranged the stylus 19 as it follows the wavy groove in the record-disk oscillates the vertical pivot 14 in a horizontal direction, which in turn vibrates the horizontal arm 17 and the diaphragm 7, 85 to which said arm is attached.

It is to be observed that the point of attachment of the arm 17 to the diaphragm is at a greater distance from the axis of the pivot 14 than is the point of the stylus 19. 90 This is important from the fact that when the machine is making a record the amplitude of vibration of the stylus-point is less than that of the diaphragm, from which it follows that when the record is reproduced 95 the stylus has a shorter distance to travel than would be the case if the arms 17 and 18 extended an equal distance from their axis. By this construction a better and purer tone is produced and the "life" of the record-disk 100 is increased.

To restrain the amplitude of vibration of the stylus 19 and return the diaphragm 7 to normal position, a flat spring 22, secured to the casing 15 near its lower end, extends upwardly and bears against a bar or plate 21, attached to the pivot or shaft 14. (See Figs. 4 and 6.) 105

A sleeve 9, forming a part of the horn 4 or other sound-receiver and adapted to slide or 110 fit over or within the tube 8, has secured to it one of the elements of the ball-joint 5, the

other element 10^a being attached to the small end of the horn 4. The inner element 10 on the sleeve 9 consists of a thin sphere, preferably of metal, mounted on the end of said sleeve which passes entirely through the sphere, as indicated in Fig. 4. The outer element 10^a is of hemispherical form, with projecting lugs 11 slightly thicker than the rest of the element on each side and a socket or cut-away portion 11^a on the top. (See Fig. 5.) The elements 10 and 10^a are so arranged that when assembled they do not contact except at the pivoted points and can be moved relatively to each other in a vertical direction only on screw-pivots 12, which pass through the lugs 11 and into the spherical element 10, where they are held by nuts 13. By this means friction is reduced to the minimum.

Instead of screws and nuts any other equivalent means may be employed to pivotally join the elements 10 10^a on a horizontal axis.

The horn is pivoted at 20' to its support 21, said pivot being in the same vertical plane as the center of the record-disk, so that as the stylus travels inwardly from the periphery of the disk it will describe an arc (see dotted line, Fig. 2) passing through the axis of the record-disk. It is to be observed that the stylus does not lie in the axis of the sound-box, but outside thereof, which arrangement tends to draw the recording and reproducing device toward the center of the record-disk as the latter rotates.

From the construction above described it will be noted that a straight unobstructed passage-way for the sound-waves is produced, free from curves and other impediments which tend to break up and muffle the sound produced by the vibrating diaphragm. The joint 5 as formed permits the stylus to move with great freedom in a vertical direction, but holds it firmly against any side play, so that it is compelled to accurately follow the

wayy groove on the record-disk when reproducing sound and when inscribing a record to form a groove exactly in harmony with the vibrating diaphragm. The end of the horn at its attachment to the element 10^a is slightly larger than the end of sleeve 9 to permit the sound-waves to enter the horn without obstruction.

The stylus 19 may be readily removed from the record-disk by swinging the recording and reproducing mechanism 3 in an upward direction on the joint 5, where it is held by the socket 11^a, into which the sleeve 9 enters.

Having thus described my invention, I claim

1. In a sound recording and reproducing mechanism, a sound-box, a vertically-disposed diaphragm mounted therein, a stylus-lever pivotally mounted upon said sound-box and having its pivotal axis in the same plane as that of the diaphragm, one arm of said lever connected to said diaphragm and the other or stylus arm of said lever projecting downwardly at an acute angle to the axis of said pivot and having its free end nearer to said pivotal axis than the free end of the first-mentioned arm of said lever.

2. In a sound recording and reproducing mechanism, a sound-box, a vibratory diaphragm therein, a vertical pivot lying in the plane of said diaphragm, a stylus-lever mounted on said pivot, one arm of which lever is attached to the diaphragm, the other and shorter arm carrying a stylus, and a centering-spring attached at one end to said sound-box and bearing at its other end against a flattened portion on the pivot.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

EDWARD F. SHUE.

Witnesses:

HUGH M. STERLING,
C. C. BURDINE.

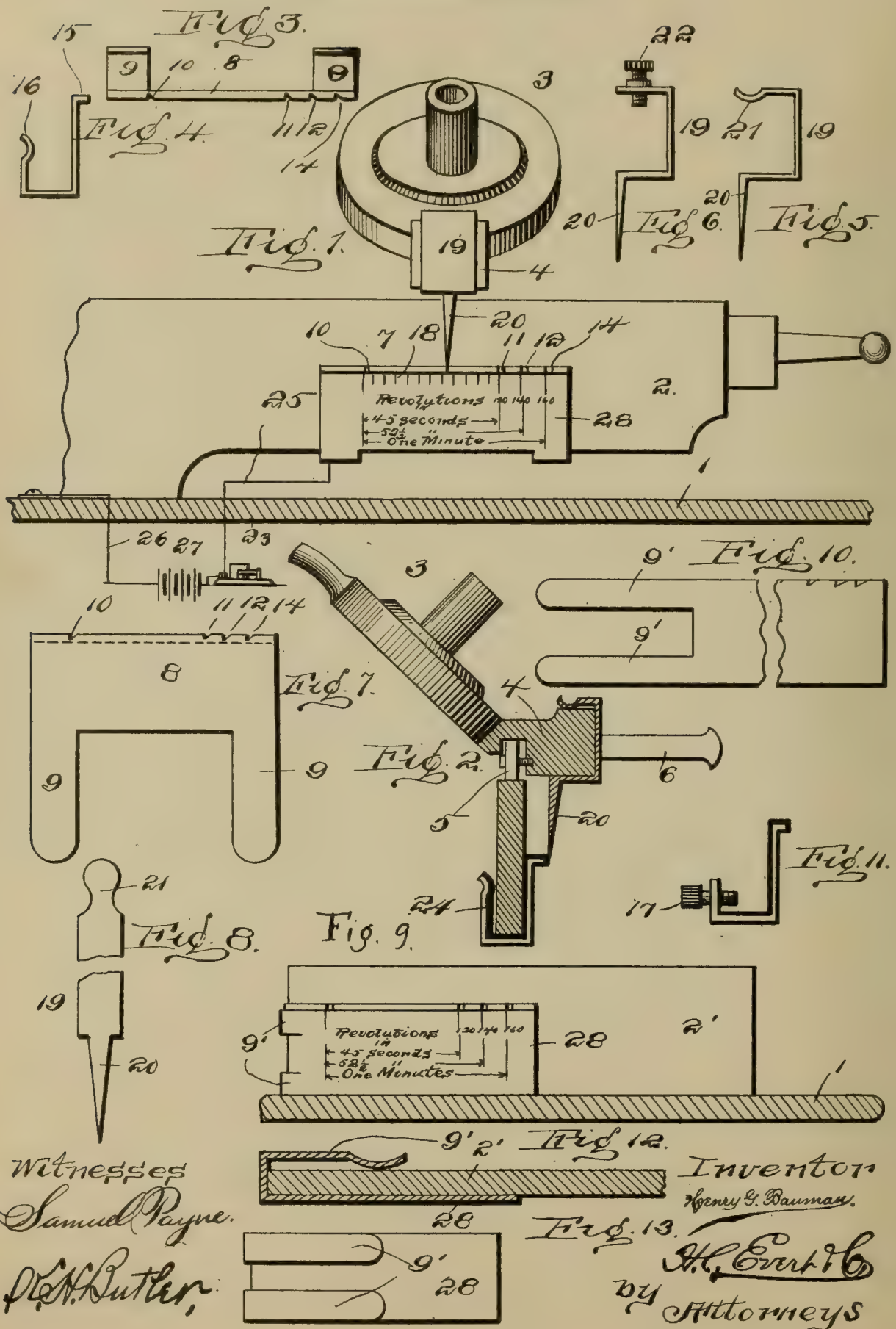
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No. 842,059.

PATENTED JAN. 22, 1907.

H. G. BAUMAN.
PHONOGRAPH.

APPLICATION FILED FEB. 26, 1906.



Witnesses
Samuel Payne.
H. N. Butler.

Inventor
Henry G. Bauman.

Attorneys
H. C. Everts & Co.

UNITED STATES PATENT OFFICE.

HENRY G. BAUMAN, OF PITTSBURG, PENNSYLVANIA.

PHONOGRAPH.

No. 842,059.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed February 26, 1906. Serial No. 302,988.

To all whom it may concern:

Be it known that I, HENRY G. BAUMAN, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in indicators for phonographs, graphophones, and like reproducing-machines.

15 The primary object of this invention is to provide a speed or revolution indicator for phonographs or like machines that will admit of adjusting the spindle of the machine to the same speed as was used in making the records, thereby insuring a clear and harmonious rendition of the music or speech in reproduction.

20 To this end my invention aims to provide a simple, inexpensive, and durable indicator or register for phonographs that can be readily applied to the present type of phonographs by unskilled persons, thus permitting of the owners of phonographs obtaining the indicators and applying them for the purposes above specified.

25 It is a well-known fact that records are made to one hundred and twenty, forty, and sixty revolutions. This makes it necessary to adjust the machine so it will travel or carry the speaker-arm to some given distances in seconds and to other distances in minutes. With my improved indicator attached to the phonograph the operator can quickly and accurately regulate the speaker-arm to make the proper number of revolutions, no matter at what speed the record was recorded.

30 While the speed at which the record is made is known to the purchaser, there is no indicating device on the machine to show at what speed or number of revolutions the spindle is making, and while the machine may be regulated to a faster or slower speed it is necessary to use a device to indicate and regulate the revolutions to the same speed required to reproduce as that which was used in making the record.

35 My improved indicator permits of a clear rendition of the piece of music being reproduced by the phonograph-record, this being accomplished by observing the number of revolutions or the speed at which the record

traveled when receiving the piece of music, and when the record is placed upon a phonograph equipped with my improved indicator the indicator will designate the speed at which the record should travel in order to correctly reproduce the piece of music carried by the record. 60

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts to be hereinafter more fully described and claimed, and, referring to the drawings accompanying this application, like numerals of reference designate corresponding parts throughout the several views, in which— 65

Figure 1 is a front elevation of the slide-rest of a phonograph equipped with my improved indicator, also illustrating a portion of the speaker-arm. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a plan of the indicator-plate. Fig. 4 is an end view of the same. Fig. 5 is a side elevation of a pointer used in connection with the indicator. Fig. 6 is a similar view illustrating a slightly-modified form of construction. Fig. 7 is a developed view of the indicator-plate. Fig. 8 is a similar view of the indicator-pointer. Fig. 9 is a front elevation of a slide-rest of a phonograph, illustrating the same equipped with a slightly-modified form of indicator. Fig. 10 is a developed view of the indicator illustrated in Fig. 9 of the drawings. Fig. 11 is an end view of the indicator-plate illustrated in Fig. 1 of the drawings, illustrating a slightly-modified form of fastening means used in connection with the same. Fig. 12 is a longitudinal sectional view of the slide-rest and indicator illustrated in Fig. 9 of the drawings. Fig. 13 is a rear elevation of the indicator-plate illustrated in Figs. 9 and 12 of the drawings. 85 90 95

In the accompanying drawings I have illustrated the bed-plate 1 of a phonograph as having an elevated slide-rest 2. In connection with the bed-plate and the slide-rest I have also illustrated the usual arm and diaphragm 3 of a phonograph, commonly known as the "speaker." The speaker is provided with an outwardly-extending arm 4, the rear face of which is provided with a roller 5, that travels upon the top edge of the slide-rest when the phonograph is in operation. The arm 4 is also provided with an outwardly-extending handle 6, by which the speaker is 100 105 110

manipulated when out of engagement with the record of the phonograph.

My invention resides in providing the slide-rest with an indicator 7, the indicator 5 being constructed of a metallic plate 8, carrying side prongs 9 9 at each end thereof. The side of the plate 8 opposite the prongs 9 9 is notched, as at 10, 11, 12, and 14. This side of the plate is bent at right angles to 10 form a flange 15, as clearly illustrated in Figs. 1, 2, and 4 of the drawings. The prongs 9 9 are bent rearwardly and upwardly to embrace the lower edge of the slide-rest, the extreme end of the prongs being curved, 15 as at 16 16, to engage against the rear side of the slide-rest 2. The prongs 9 9 are made resilient, whereby they will firmly embrace the lower edge of the slide-rest and retain the indicator-plate 8 in engagement therewith. 20 The curved portion of the prongs 9 9 can be dispensed with and set-screws 17 17 employed for retaining the indicator-plates in engagement with the slide-rest. (See Fig. 11.)

Upon the indicator-plate, adjacent to the 25 flange 15 thereof, are arranged graduations 18, these graduations being spaced whereby one and six-tenths inches will represent one hundred and sixty revolutions per minute of the phonograph-record, one and four-tenths 30 inches will represent one hundred and forty revolutions in fifty-two and one-half seconds, and one and two-tenths inches will represent one hundred and twenty revolutions in forty-five seconds. The graduations corre- 35 sponding to the notches 11, 12, and 14 are marked "120," "140," and "160," respectively, while upon the plate are printed the words "Revolutions in 45 seconds," "52½ sec- 40 onds," and "1 minute," suitable arrows or dashes being printed upon the plate to indicate that the "45 seconds" designates one hundred and twenty revolutions, "52½ sec- 45 onds" designates one hundred and forty revolutions, and "1 minute" designates one hundred and sixty revolutions.

In connection with the speaker-arm 4 I use a metallic pointer 19, said pointer being constructed to form a yoke having a depend- 50 ing needle 20, adapted to travel upon the front edge of the flange 15 of the indicator-plate. In this instance the pointer 19 has its upper end curved, as at 21, in order that it may be clamped upon the speaker-arm; but a set-screw 22 (see Fig. 6) can be readily used 55 for clamping the pointer thereon.

When a phonograph is in operation, the speaker-arm is adapted to carry the needle 20 along the indicator-plate, and by observing said plate it can be determined whether the 60 phonograph is properly operated to reproduce a clear interpretation of the piece of music of the phonograph-record. In placing the pointer 19 upon the speaker-arm I arrange the needle 20 thereof whereby it will 65 engage the front edge of the flange 15 of the

indicator-plate with a slight pressure, whereby when the needle reaches the notches 11, 12, and 14 it will recede into one of said notches and create a click or noise which will attract 70 the operator's attention in order that the number of revolutions at which the machine is traveling may be observed.

In Fig. 1 of the drawings I have illustrated a "telegraph-sounder" 23 as being used in 75 connection with the indicator-plate, whereby the sounder may give alarm when the needle has reached either of the notches 11, 12, or 14. To accomplish this, a suitable insulation 24 is inserted between the slide-rest 2 and the 80 indicator-plate, and a wire 25 is connected to the indicator-plate and to the sounding instrument, while another wire 26 connects the instrument with a battery 27 and the base- 85 plate 1 of the machine. In lieu of the sounding instrument 23 an electric bell may be used.

In Figs. 9, 10, 12, and 13 I have illustrated a portion of the phonograph as having an in- 90 tegral base-plate 1' and a slide-rest 2'. I have therefore devised an indicator-plate 28 similar in construction to the plate heretofore described, with the exception that the lugs 9' 9' are formed at the end of the plate, whereby said lugs may be bent around the 95 end of a slide-rest to retain the indicator-plate in position upon said rest, otherwise the plate being identical in construction to the indicator-plate heretofore described, and illustrated in Fig. 1 of the drawings.

From the foregoing description, taken in 100 connection with the drawings, it will be observed that my improved indicator is extremely simple in construction and can be readily applied to various forms of phono- 105 graphs by unskilled labor, and by observing the indicator and regulating the governor of the phonograph in accordance therewith a correct rendition or interpretation of a record of music can be obtained.

The click or noise created by the needle re- 110 ceeding into one of the notches of the indicator-plate permits of the operator giving his entire attention to the watch or timepiece when timing the speaker-arm, making it unneces- 115 sary to observe the indicator-plate and watch at the same time to see when the needle arrives at the starting-point or one of the notches for the finish. The graduations of the indicator-plate are arranged in tenths, and twelve tenths of an inch are adapted to 120 indicate that the record has traveled one hundred and twenty revolutions in forty-five seconds, and should the catalogue of the records state that a record is to travel one hundred and sixty revolutions the machine can be 125 easily and quickly adjusted to permit of a clear rendition or interpretation of the record. The telegraph-sounder is used for the same purpose, so that the click of the needle may 130 be electrically or mechanically indicated.

Such changes in the construction and operation of the indicator as are permissible by the appended claims may be resorted to without departing from the spirit and scope of the invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with the slide-rest and speaker-arm of a phonograph, of a depending needle detachably connected to said speaker-arm, a graduated plate connected to said slide-rest and in circuit with a battery and sounder, substantially as described.

2. In an indicator, the combination with the slide-rest and speaker-arm of a phonograph, of a depending needle detachably connected to said arm, an indicator-plate connected to said slide-rest and having notches formed therein, and graduations arranged thereon adapted to indicate the movement of said needle, substantially as described.

3. In an indicator, the combination with

the speaker-arm and slide-rest of a phonograph, of a graduated plate detachably connected to said slide-rest a depending needle detachably connected to said speaker-arm and adapted to engage said plate, and means to sound an alarm when said needle reaches certain graduations, substantially as described.

4. In an indicator, the combination with the slide-rest and speaker-arm of a phonograph, of a plate connected to said slide-rest and having graduations arranged thereon, means carried by said speaker-arm to designate upon said plate the rapidity at which said arm is traveling, substantially as described.

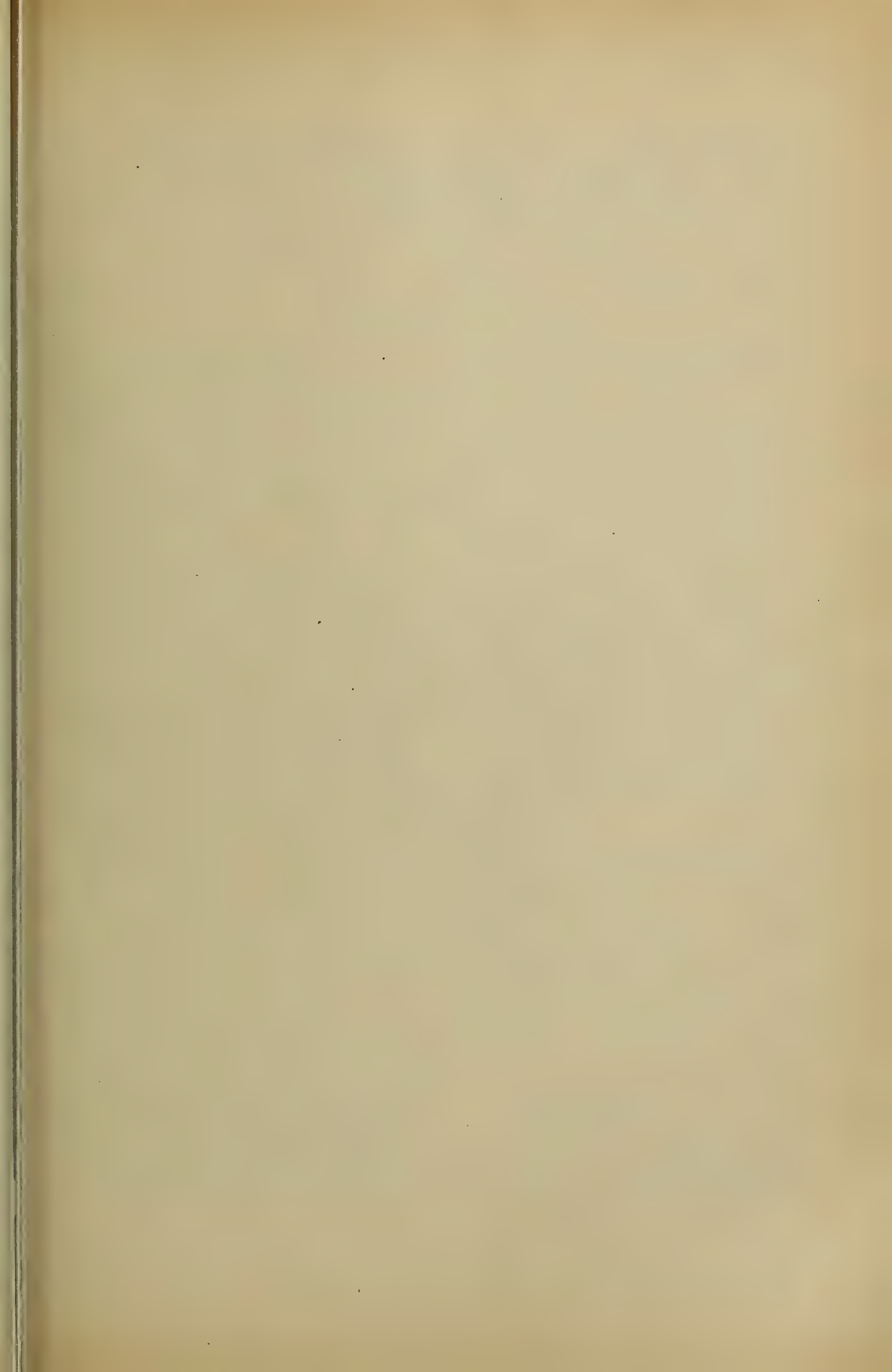
In testimony whereof I affix my signature in the presence of two witnesses.

HENRY G. BAUMAN.

Witnesses:

A. M. WILSON,

H. C. EVERT.



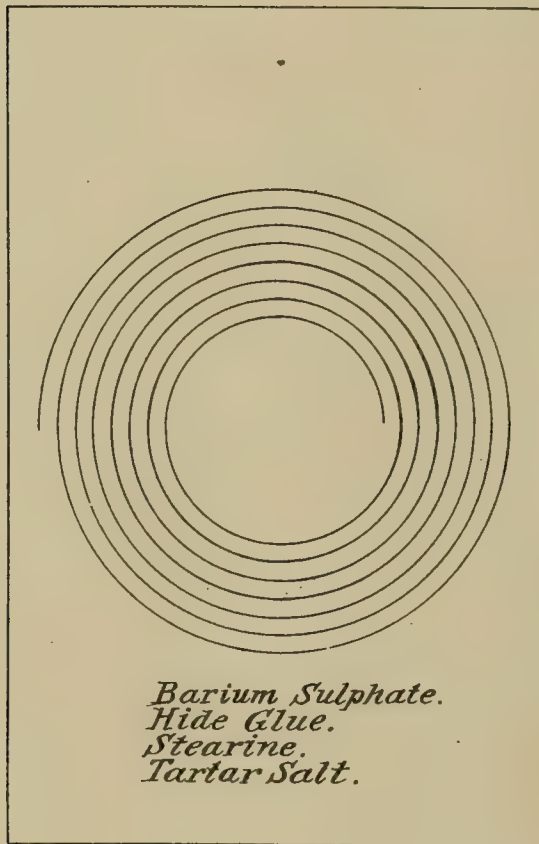
No. 842,070.

PATENTED JAN. 22, 1907.

E. J. B. BROCHERIOUX, P. J. TOCHON, A. FORTIER & L. V. MAROTTE.

COMPOSITION FOR SOUND RECORDS.

APPLICATION FILED OCT. 12, 1905.



WITNESSES :

W. M. Avery

Walton Harrison.

INVENTORS

Emilien J. B. Brocherioux

Paul J. Tochon

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Leon V. Marotte

BY

Mumm Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

EMILIEN JEAN BAPTISTE BROCHERIOUX, PAUL JOSEPH TOCHON, ALFRED FORTIER, AND LEON VICTOR MAROTTE, OF PARIS, FRANCE.

COMPOSITION FOR SOUND-RECORDS.

No. 842,070.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed October 12, 1905. Serial No. 282,498.

To all whom it may concern:

Be it known that we, EMILIEN JEAN BAPTISTE BROCHERIOUX, publisher, of 23 Quai Voltaire, PAUL JOSEPH TOCHON, merchant, of 3 Rue des Deux-Boules, ALFRED FORTIER, printer, of 35 Rue Jussieu, and LEON VICTOR MAROTTE, printer, of 35 Rue Jussieu, in the city of Paris, Republic of France, have invented a Composition for Sound-Records, of which the following is a full, clear, and exact description.

The object of this invention is the production of a special composition designed to be applied to the surface of paper, cardboard, pasteboard, and other substances to form a film or coating on which sounds may be recorded and subsequently reproduced by means of a phonograph.

The invention is especially suitable for the production of phonogram-cards and postal phonogram-cards or cards which bearing the record may be forwarded by post and read by the recipient by means of a phonograph.

The composition is composed of permanent white, (barium sulfate,) zinc-white, (light oxid of zinc,) and a special encaustic, (made by dissolving stearin in water in the presence of salt of tartar,) hide-glue, and water in the following proportions: permanent white, 0.250 kilograms; zinc-white, 0.125 kilogram; encaustic, 0.250 kilogram; glue, 0.187 kilogram; water, one-half liter.

The encaustic is itself prepared according to the following formula: stearin, two kilograms; salt of tartar, 0.125 kilogram; water, forty liters.

In preparing the composition we proceed as follows: First, the permanent white, the encaustic, the zinc-white, and the water are mixed, and the ingredients are incorporated or blended together until the whole becomes a homogeneous mass. Second, the glue dissolved in a water-bath is then added. Third, the mixture is then strained. This composition is applied in layers spread by means of a brush, one coat being allowed to dry before the next is applied. The card or surface thus coated is rolled or surfaced either by being subject-

ed to pressure between metal plates—zinc plates, for example—or passed between calendering-rolls.

The constituent elements of the above-mentioned composition may be replaced by their chemical equivalents or analogues; but in order to impart to the composition the requisite qualities it is necessary that it should contain all the substances mentioned or their substitutes.

The sulfate of baryta may be replaced by one or several of the following substances—viz., either the sulfate or the carbonate of lead or by precipitated calcium sulfate, as well as, but less efficaciously, by carbonate of baryta, precipitated sulfate of strontium, or precipitated carbonate of strontium or carbonate of lime. The light oxid of zinc may be replaced by the precipitated oxid, sulfid, or carbonate or by kaolin, talc, calcined English magnesia, carbonate of magnesia, or precipitated alumina.

Instead of hide-glue we may employ fish-glue, paste, dextrine, or gelatin; but hide-glue is preferable, as it renders the coating softer and more supple.

We claim—

1. The herein-described composition of matter, consisting of permanent white, zinc-white, stearin, salt of tartar, glue and water admixed into a paste.

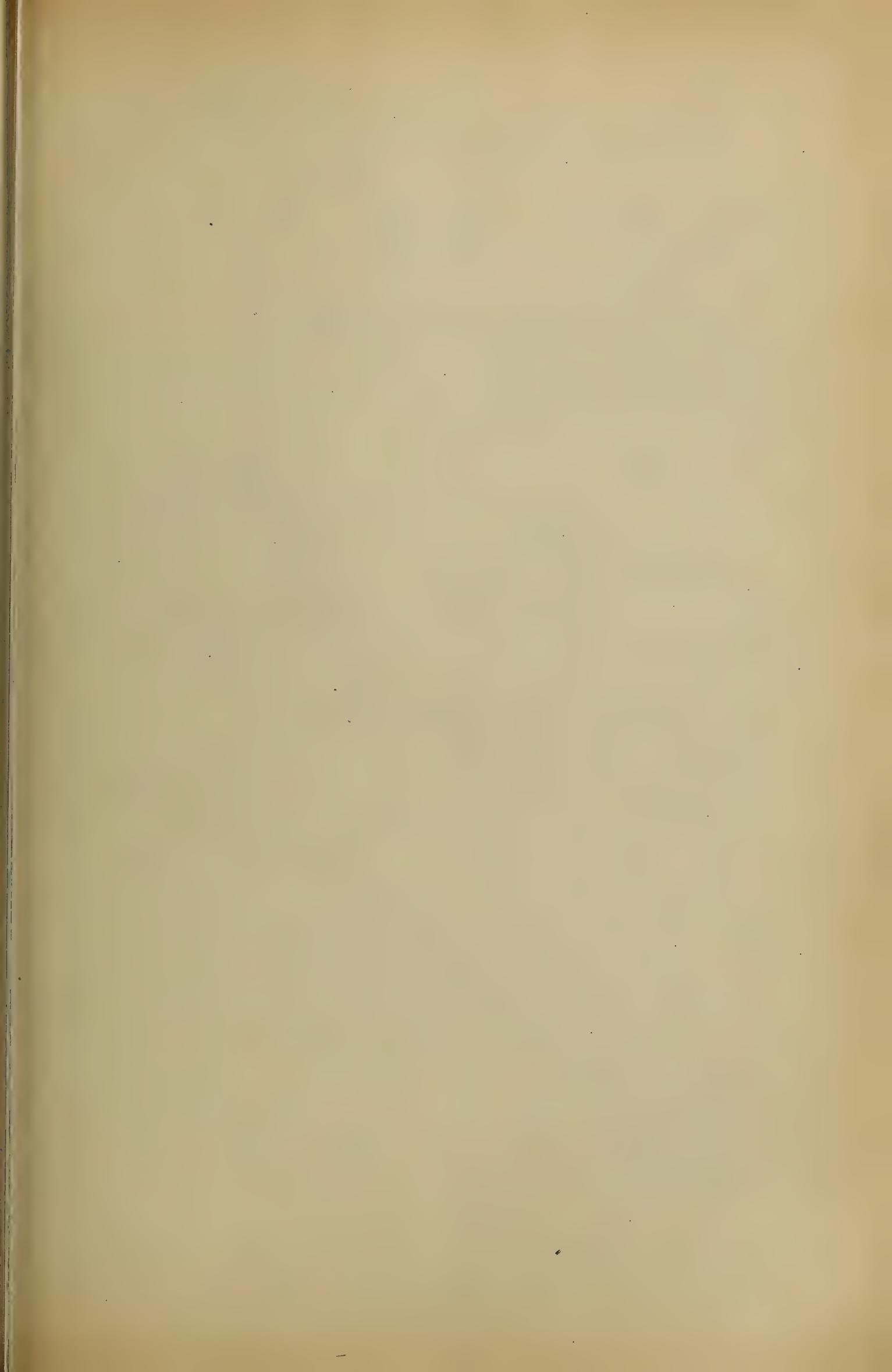
2. The composition herein described, consisting of permanent white and encaustic zinc-white and glue.

The foregoing specification of our composition for application to paper, cardboard, and other substances to form a coating for recording and reproducing sounds phonographically signed by us this 27th day of September, 1905.

EMILIEN JEAN BAPTISTE BROCHERIOUX.
PAUL JOSEPH TOCHON.
ALFRED FORTIER.
LEON VICTOR MAROTTE.

Witnesses:

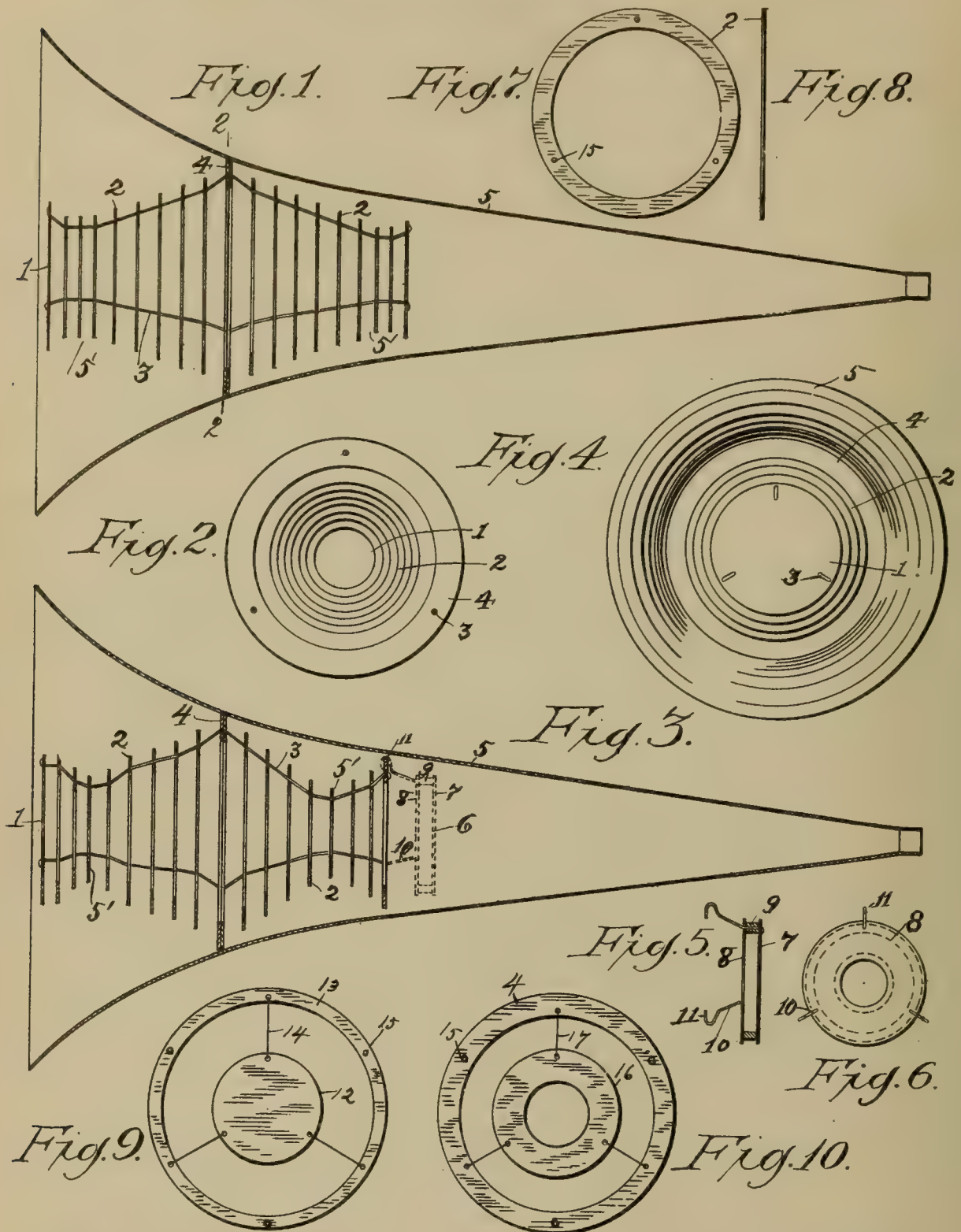
HANSON C. COXE,
GEORGES CHARLES COQUET.



O. G. ROSE.

ATTACHMENT TO HORNS FOR SOUND REPRODUCING INSTRUMENTS.

APPLICATION FILED MAR. 22, 1906.



WITNESSES:

Robert Farnsworth
W. R. Seely

INVENTOR.

O. G. Rose
 BY *Spear & Seely*
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

OVEREND G. ROSE, OF CAMP MEEKER, CALIFORNIA.

ATTACHMENT TO HORNS FOR SOUND-REPRODUCING INSTRUMENTS.

No. 842,707.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed March 22, 1906. Serial No. 307,413.

To all whom it may concern:

Be it known that I, OVEREND G. ROSE, a citizen of the United States, residing at Camp Meeker, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Attachments to Horns for Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to certain improvements in horns for sound-reproducing instruments—such as phonographs, graphophones, and disk talking-machines—and it has for its object the projection and analysis of the sound as it passes through the horn.

As generally constructed the horns for sound-reproducing instruments are open or unobstructed throughout their length and are attached to the sound-box of the instrument in such a manner that when the diaphragm of the reproducer is vibrated the sound apparently comes from the interior of the horn and is correspondingly cramped or blurred, which renders it difficult to understand the human voice or to distinguish or separate the tones of the different instruments from each other.

I have discovered that by providing the horn, preferably at or near its outer end, with a compound diaphragm, which I shall call a "projector and sound-analyzer," the sound is repeated, as it were, from the diaphragm of the sound-box and caused to apparently come from the mouth or outer end of the horn. In addition to this the tones of the different instruments are analyzed or separated, so that those of each instrument are caused to be repeated by and to apparently come from a portion of the diaphragm corresponding, respectively, with the relative positions that the instruments were stationed from the recording apparatus when the record was made—that is, the instruments that were situated at the least distance from the recorder will appear as coming from the outer or more exposed portions of the diaphragm, while those that were located at a greater distance will appear as coming from the portions of the diaphragm located within the horn or at a greater distance from its mouth or outer end. By reproducing or transmitting the sound in this manner the vibrations from my diaphragm are more evenly distributed, and therefore more distinctly heard in all directions from the mouth of the horn than where the horn is open or

unobstructed throughout its length, and by separating the tones of the instruments from each other a much more pleasing effect is produced than when the tones of all of the instruments are commingled promiscuously and projected more directly in the line of the axis of the horn.

An embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a horn for sound-reproducing instruments provided with one form of my invention. Fig. 2 is a transverse sectional view of the attachment, taken on the line 2 2 of Fig. 1. Fig. 3 is a view similar to Fig. 1, showing a different form of the invention. Fig. 4 is a plan view looking into the mouth of the horn. Fig. 5 is a transverse sectional view of a sound-box for the attachment. Fig. 6 is a plan view of the same. Fig. 7 is a plan view of one of the disks, and Fig. 8 is an edge view of the same. Figs. 9 and 10 are modifications.

In the form of my invention shown in the drawings it consists of a plurality of disks and 2, secured parallel to each other at a suitable distance apart by retainers, as wires or connectors 3. The disks are of different diameters and all are annular except the end ones in the form shown in Fig. 1 and only the front one in the form shown in Fig. 3, which thereby closes the passage formed by the openings in the other disks. The disks are arranged in two series, which taper from the larger or central disk 4 toward the ends, and the disk 4 is of such a diameter that when it is placed within the mouth or open end of a horn the front or imperforate disk 1 will stand at a short distance from a plane passing through the outer edge of the bell or rim of the horn.

Instead of having the taper extend gradually entirely to the end or last disk of the attachment I have secured the best results by slightly increasing the size of the last disk and, in some instances, of one or two disks adjacent thereto, thereby forming a contraction of a greater or less degree, as shown at 5', adjacent to the end, and with the longer horns I have also found it desirable to use a sound-box upon the inner end of the attachment, as shown at 6 in dotted lines in Fig. 3.

The disks can be made of any suitable material, as metal, fiber, vulcanite, leather, and may be of any desired size and thickness, the central one being preferably thicker

than the others to secure the necessary strength for supporting the others, and they can be located at any suitable distance apart, but in actual use I have secured very marked
 5 and agreeable results by using eight disks upon each side of the central or supporting disk 4, exclusive of the end disks or the sound-box where the latter is used in place of the inner or what I shall call the "cone-
 10 disk," and by placing the outer or what I shall call the "focusing-disk" five-sixteenths of an inch from the outer edge or rim of the horn and the fixed or central disk 4 six and three-fourths of an inch inward from the rim.
 15 The distance that the disks should be placed apart varies from three-fourths of an inch to seven-sixteenths, according to the length of the horn, three-fourths being preferably in a thirty-inch horn and one-half an inch in
 20 horns only twenty-four inches long. The internal diameters decrease regularly by one half an inch from the central disk, which is six inches toward each end except the first disk each side of the central one, which decreases one inch, and the last two disks at
 25 the end, which are of the same size—that is, two inches at the outer end and two and a half inches at the inner end. The external diameters decrease in substantially the
 30 same ratio, the width of the disk or ring at any point being three-quarters of an inch, thus making the outside diameter one and a half inches greater than the inside diameter. In narrow horns the inner or what I shall
 35 call the "projection disks" may be made smaller and arranged to decrease in size more rapidly from the central disk, and the last or tone disk is preferably imperforate, the same as the outer or focusing disk, as
 40 shown in Fig. 1.

With horns thirty inches or over in length it has been found desirable to use an open or annular disk for the last disk upon the
 45 inner end and to use in connection therewith the sound-box 6, which consists of two annular disks 7 and 8, that are spaced apart by the rim 9, and preferably connected with the last inner disk by arms 10. The inner ends
 50 of the arms are bent into hooks 11, so as to be connected with or detached from said inner disk when desired. The openings in the disks 7 and 8 are of different diameters, with the one having the larger diameter arranged toward the inner or smaller end of the horn.

55 In case the ordinary focusing or tone disk cannot be used, as where the bell or horn is too narrow or contracted or from any other cause, the human voice or other sounds made close to the recorder can be focused at
 60 the mouth of the horn by suspending a small imperforate vibrating focusing-disk 12 in front of the last of the perforated disks. This disk is preferably of the same diameter as the aperture of the last annular disk and
 65 may be suspended in any desired manner;

but I prefer to suspend it from a ring 13 by wires 14, preferably very small or hair-like. The ring 13 is preferably in the form of a narrow annular disk which is supported upon
 70 the ends of the wires 3 by means of the regular supporting-holes 15. In other cases the sound-box 6 may be dispensed with and very satisfactory results obtained by suspending
 75 a vibrating annular disk 16 in the aperture of one or more of the projecting disks, and especially in the central disk 4, preferably by means of small wires 17.

In using the attachment as above described it is inserted in the larger end of the
 80 horn as far as it will go until the central disk engages with the interior of the horn in a plane at right angles to the axis of the horn, which will hold the other disks substantially concentric within the horn, but at a sufficient
 85 distance therefrom to permit of the passage of the sound-waves from the reproducer at the smaller end. Where it is desirable to use the sound-box 6, it is secured to the inner end of the attachment before the latter is inserted
 90 into the horn. The reproducing instrument is then started, which will cause sound-waves to be generated that will traverse the horn until they meet the inner or projection disks, and are thereby forced through the aperture
 95 of the central or supporting disks, and from there the waves will pass to the outer or analyzing disks which terminate with an imperforate focusing-disk nearly in a line with the rim of the horn. When the sound is projected and analyzed in this manner, the tones
 100 of the different instruments will come from the different analyzing-disks and apparently in the same relative distance from each other and from the mouth of the horn that the instruments occupied when making the record.
 105 For instance, the trombones and cornets are generally placed at the greatest distance from the recording instrument and their tones will be given out by the disks lying nearest the middle of the attachment. The
 110 tubas and altos are placed at about half of that distance from the recorder and their tones will come from the disks substantially half-way between the central disk and the rim of the horn. The piccolos and snare-
 115 drums are still closer to the recording instrument and their tones will come from the disks almost at the end of the analyzer, while the singer or speaker having stood within a few
 120 inches from it and the clarionets having been blown across the mouth of the recording-horn those tones will come from the focusing-disk at the forward end of the attachment. The splitting up or separating of the mass of
 125 sound that comes from the reproducing-horn in this manner into the sound of the respective instruments and then focusing the sounds at the same relative distance that the instruments were from the record when they
 130 were being played makes the sounds more

natural and distinct than they otherwise would be, for the reason that my attachment destroys the over tones and metallic resonance, and being produced close to the mouth of the horn enables the audience to hear as well twenty or thirty feet or more behind the horn as in front. The human voice being focused in or thrown off from the disk which is located almost in a plane with the rim of the horn will cause it to sound all over the room or hall, and the articulation is rendered clear and distinct and so natural that individual voices can be readily recognized.

Although I have shown and described my invention in the form in which I have secured the most desirable results, I do not wish to be limited to the exact number and sizes of the disks nor to the specific distances that they are apart. Nor do I wish to be limited to annular disks, as other forms may be used and flat spiral coils may also be substituted for the disks, and flexible connectors may be substituted for the rigid wires, thereby permitting of the device being collapsed or folded together, which result may also be secured in the spiral form without any connector at all.

What I claim is—

1. An attachment for the horns of sound-reproducing instruments, comprising a cage-like structure composed of a series of flat disks arranged in parallel planes and connected together, and adapted to be held as a complete structure within the horn.

2. In a sound analyzer for phonograph-horns, a plurality of annular disks and an imperforate disk arranged at a distance from each other and adapted to be secured in the horn, the annular disks decreasing in internal and external diameter toward the forward end and the imperforate disk being arranged at the smaller end.

3. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, the apertures in said disks decreasing in diameter from the middle toward each end.

4. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, said disks decreasing in external and internal diameters from the middle toward each end.

5. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance from each other and adapted to be secured in the horn, an imperforate disk at the forward end and a sound-box at the inner end.

6. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks of variant diameters, and wires for holding them at a distance from each other with their centers in the axis of the horn.

7. In a sound projector and analyzer for phonograph-horns, a plurality of annular disks arranged at a distance apart and adapted to be secured in the horn, and an imperforate disk at the forward end and a sound-box at the inner end, said box comprising two annular disks and a rim therebetween, and arms provided with hooks for securing it in position.

8. The combination with a phonograph-horn, a plurality of annular disks in the larger end thereof, said disks being at a distance from each other and decreasing in diameter from the middle toward each end, the middle disk engaging with the horn for supporting itself and the other disks at substantially right angles to the axis of the horn and with their peripheries out of contact with the horn.

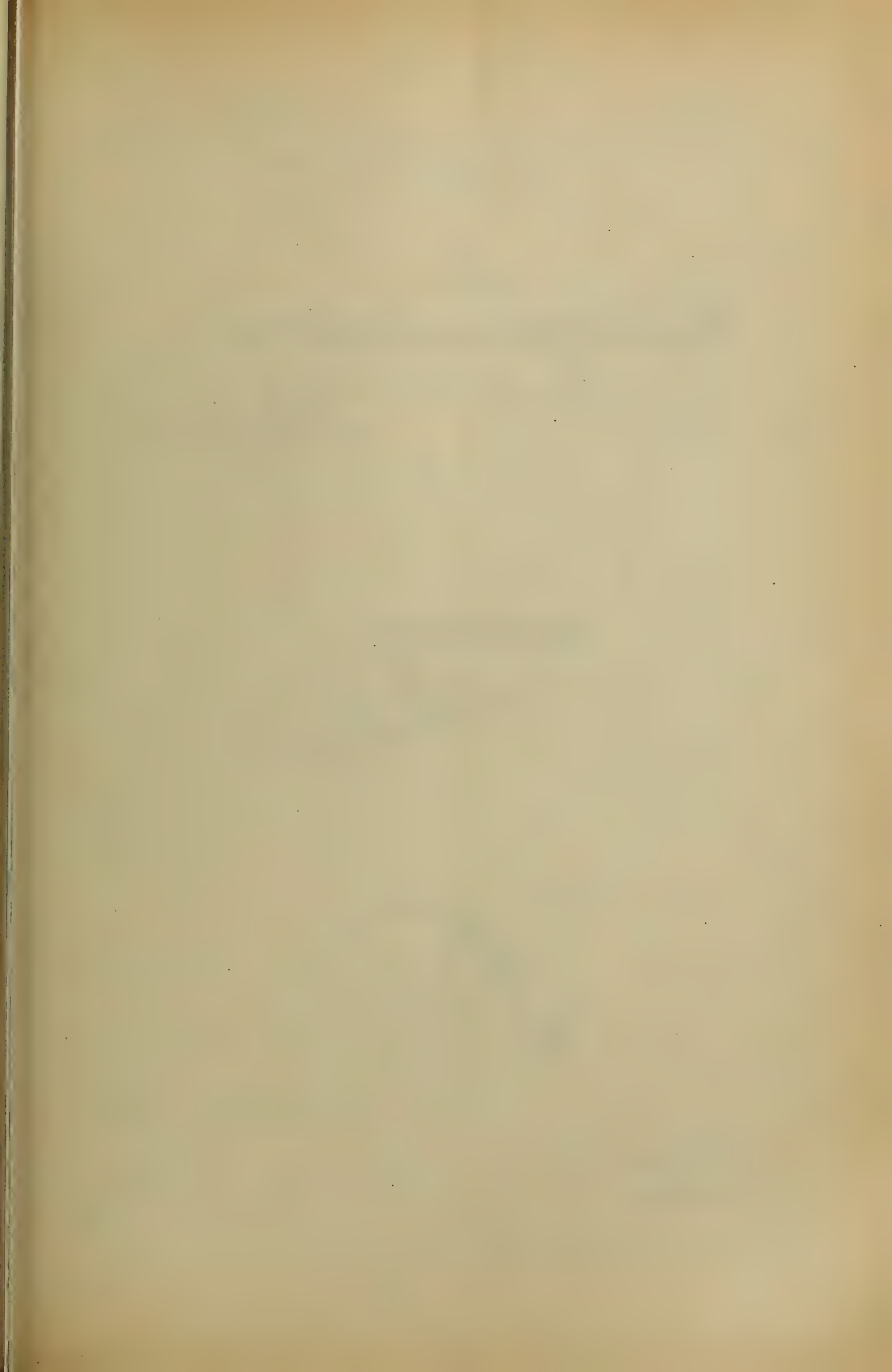
9. The combination with a phonograph-horn, of a plurality of annular disks in the larger end thereof, and an annular disk in the aperture of one or more of said larger disks.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 1st day of March, 1906.

OVEREND G. ROSE.

Witnesses:

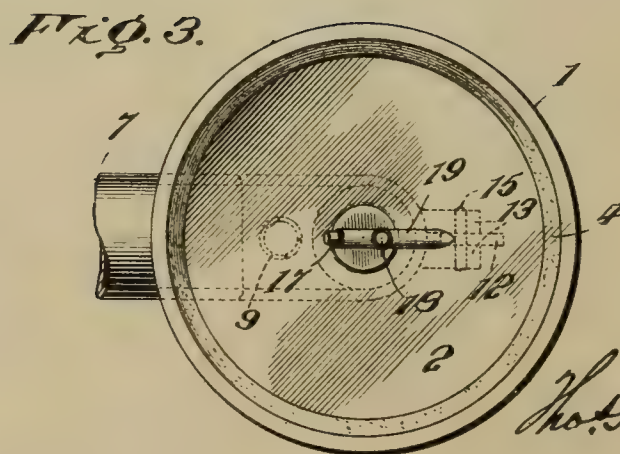
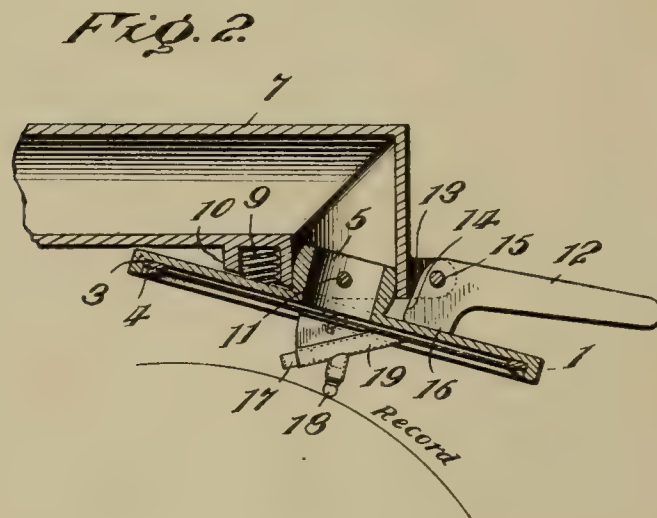
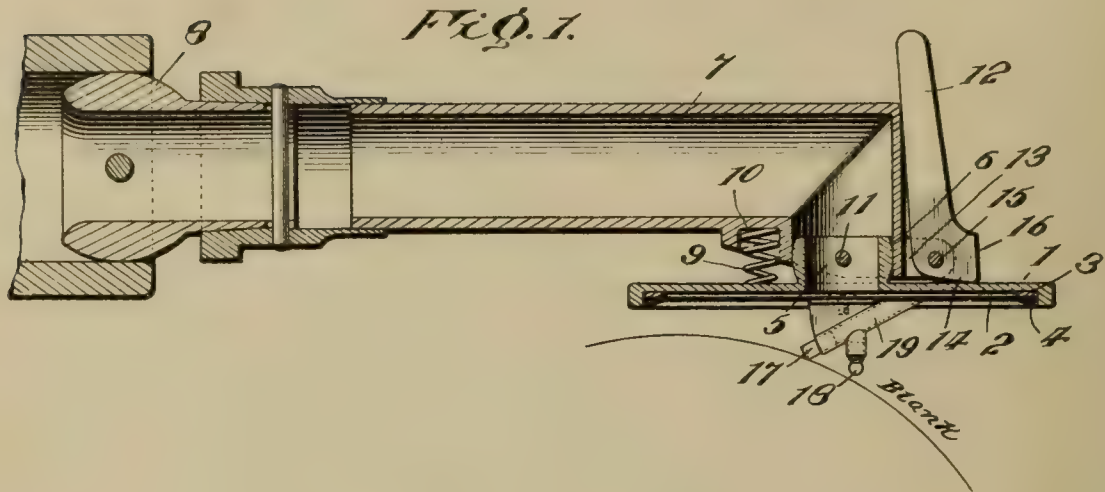
M. R. SEELY,
F. M. BARTEL.



No. 842,897.

PATENTED FEB. 5, 1907.

T. H. MACDONALD.
COMBINED RECORDER AND REPRODUCER.
APPLICATION FILED JAN. 16, 1906.



Witnesses

W. B. K. Row
L. H. Schmidt.

Inventor

T. H. MacDonald

By

Maurice Cameron Lewis Massie
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT,
A CORPORATION OF WEST VIRGINIA.

COMBINED RECORDER AND REPRODUCER.

No. 842,897.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed January 16, 1906. Serial No. 296,365.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in a
5 Combined Recorder and Reproducer, which invention is fully set forth in the following specification.

This invention relates to recorders and reproducers for talking-machines, and has for
10 its object to obtain in one structure a device which can be used at will in connection with any suitable record-tablet, either for recording sound-waves or for the reproduction of sound previously recorded.

15 With this object in view the invention consists of a combined recorder and reproducer, comprising a single diaphragm with a recording-style and a reproducing-style both connected to the diaphragm, the whole being arranged so that the recording-style or the re-
20 producing-style can be shifted, the one out of contact with the record-tablet and the other into contact, or vice versa.

More specifically stated, the invention consists of a single diaphragm, preferably mounted in a suitable casing or head, which casing or head is capable of being tilted for a slight distance upon a pivot or axis, on which it is supported, so that the diaphragm can be shifted
30 into two different planes. On this diaphragm is secured a cutting-style for the purpose of making a record, and a reproducing-style (preferably rounded or spherical in form) for rubbing over a previously-made
35 record to reproduce sound, the relative position of the two styles being such that when the diaphragm lies in one plane the recording-style only will rest against the record-tablet, and when the diaphragm lies in the other
40 plane the recording-style will be shifted out of contact with the record-tablet, and the reproducing-style will be brought into contact therewith. Any suitable means may be employed for shifting and retaining the diaphragm into either one of the two positions
45 above mentioned. As here shown, the diaphragm head or casing is connected to a tubular shank, whose exterior surface is approximately that of a zone of a sphere, said
50 shank being inserted a short distance into the open end of the conveying-tube of the reproducer and pivotally connected to said tube. Reacting between the diaphragm-casing and

a suitable seat, preferably formed in the wall of the tube of the reproducer, is a stiff
55 spring, while on the other side a cam-lever is pivoted to the walls of the tube, the parts being so adjusted that when the cam-lever is thrown into one position it permits the spring to throw the diaphragm-casing, and with it
60 the diaphragm, into position to bring the recording-style in contact with the record blank or tablet, the tension of the spring being resisted on the opposite side of the cam-lever of other suitable abutment. When it is de-
65 sired to shift the recording-style out of contact with the record-tablet and bring the reproducing-style in contact therewith, the cam-lever is thrown down or shifted on its pivot, thereby tilting the diaphragm-casing, and
70 with it the diaphragm, into a different plane, and compressing the spring above mentioned. This action brings the reproducer style into operative position on the record-tablet.

The inventive idea involved may receive
75 a variety of mechanical expressions, one of which, for the purpose of illustration, is shown in the accompanying drawings, but it is to be understood that such drawings are for the purpose of illustration only, and are
80 not designed to define the limits of the invention, reference being had to the claims for this purpose. It will also be understood that some features of the invention are not limited to a structure wherein both a recording and a
85 reproducing style is employed.

In the drawings, Figure 1 is a vertical section through the center of the reproducer-head and the neck or tube supporting the same, showing the diaphragm in a position to
90 bring the recording-style in contact with the record tablet or blank. Fig. 2 is a view similar to Fig. 1 with the parts in position to throw the recording-style out of contact with the record-tablet and bring the repro-
95 ducing-style into operative relation therewith, and Fig. 3 is a bottom plan view of Fig. 1.

Referring to the drawings, in which like reference-numerals indicate like parts; 1 is the reproducer head or casing, having the dia-
100 phragm 2, mounted therein in any suitable or usual way—as, for example, between gaskets 3 and 4. This diaphragm-casing 1 is provided at its back with a neck 5, having the exterior portion of its walls rounded,
105 preferably into form approximating that of

a zone of a sphere, as indicated at 6. This spherical portion of the neck 5 fits within the open end of the reproducer neck or tube 7, which is here shown in the form of a tube bent at right angles and supported at the end opposite to the reproducer-head by a suitable joint 8, though any other desired form of joint between the neck 7 and its support may be employed. The neck 5 is secured in the end of tube 7 by a pivot 11, that is parallel with the diaphragm. The spring 9 reacts between the back of the reproducer-casing and any suitable abutment 10, here shown as forced on the wall of the neck 7. This spring 9 takes bearing upon the reproducer-casing at one side of pivot 11. On the opposite side of the neck 5 from the spring 9 a cam-lever 12, here shown as a bell-crank lever, is pivoted to an ear or lug 13, projecting from the wall of the tubular neck 7. The form of the cam-lever 12 and its position with relation to the diaphragm-casing 1 is such that when it is in one position, as shown in Fig. 1, the face 14 of the lever 12 bears against the back of the diaphragm-casing, and this face 14 is at such a distance from the pivot 15 of the lever 12 as to allow the spring 9 to expand and throw the casing into a position here shown as approximately parallel with the axis of the tube 7. When, however, the cam-lever 12 is shifted into the position shown in Fig. 2, the face 16 bears upon the back of the diaphragm-casing, and said casing is shifted to a position to compress the spring 9 and throw the said casing into a plane at an angle to that of the axis of tube 7. This tilting of the casing upon its pivot is due to the fact that the face 16 of lever 12 is farther away from the pivot 15 than is face 14.

Two styles—viz., a recording-style 17 and a reproducing-style 18—are suitably connected to the diaphragm, and the parts are so arranged that when the diaphragm is in one position one of the styles is in operative relation with the record-tablet, and when the diaphragm is shifted into the other position—as, for example, when it is shifted from the position shown in Fig. 1 to that shown in Fig. 2—the first-mentioned style is thrown out of operative relation with the record-tablet and the other style is thrown into operative relation, all as will be readily understood by inspection of Figs. 1 and 2. Any suitable means for connecting the styles 17 and 18 to the diaphragm may be employed. As here shown, such means are in the form of a clip 19, of metal or other suitable material, having a plurality of sockets or chambers for receiving one end of the respective-styles, the styles being so arranged that only one of them can contact with the record-tablet at a time. This clip 19 is secured to the face of the style in any suitable way, as by cement. The particular form of

clip 19 here shown will be recognized as being substantially that shown and described in my United States Patent No. 683,958, with the addition thereto of a suitable socket for holding the reproducing-style 18.

Having thus described my invention, what I claim is

1. In a talking-machine, a combined recorder and reproducer comprising a single diaphragm mounted to tilt upon a given axis, and a recording and a reproducing style secured to said diaphragm, a spring acting to turn the diaphragm in one direction, and means operable to turn the diaphragm against the tension of said spring.

2. In a talking-machine, the combination of a pivotally-mounted diaphragm-casing, a diaphragm supported therein, a spring reacting between said casing and a suitable abutment, a style connected to said diaphragm, and means for throwing and holding said casing against the tension of said spring.

3. In a talking-machine, the combination of a diaphragm-casing having a tubular neck, a sound-conveying tube or opening to which said neck is pivotally connected, a diaphragm in said casing, a style mounted on said diaphragm, and means tilting said casing upon said pivot into a plurality of planes.

4. In a talking-machine, the combination of a diaphragm-casing having a tubular neck whose outer surface is in the form of a zone or a sphere, a sound-conveying tube within which said neck is pivotally connected, a diaphragm in said casing, a style mounted on said diaphragm, and means shifting said casing upon said pivot into a plurality of planes.

5. In a talking-machine, the combination of a diaphragm-casing having a tubular neck whose exterior is formed on the lines of a sphere, a sound-conveying tube within which said neck is pivotally mounted, a diaphragm in said casing, a plurality of styles mounted on said diaphragm, and means shifting said casing upon said pivot into a plurality of planes.

6. In a talking-machine, the combination of a diaphragm-casing, a sound-conveying tube to which said casing is pivotally connected, a diaphragm in said casing, a recording-style mounted on said diaphragm, a spring bearing on one side of said casing and a cam-lever bearing on the other side thereof.

7. In a talking-machine, a diaphragm-casing mounted to turn upon an axis, a diaphragm in said casing, a style connected to said diaphragm, a spring bearing against the casing and tending to turn it upon its axis, and means holding said casing against the action of the spring.

8. In a talking-machine, the combination with a sound-conveying tube, of a casing containing a diaphragm pivoted in the end of said tube by a pivot parallel with said diaphragm, a recording-style and a reproducing-

style fast upon said diaphragm, and devices tilting said casing and said diaphragm upon said pivot, as and for the purpose described.

9. In a talking-machine, the combination
5 with a sound-conveying tube, of a casing carrying a diaphragm and pivoted within the end of said tube by a pivot parallel with said diaphragm, a recording-style and a reproducing-style fast upon said diaphragm, and
10 oppositely-disposed devices consisting re-

spectively of a cam and a spring tilting said casing and diaphragm upon said pivot, as and for the purpose described.

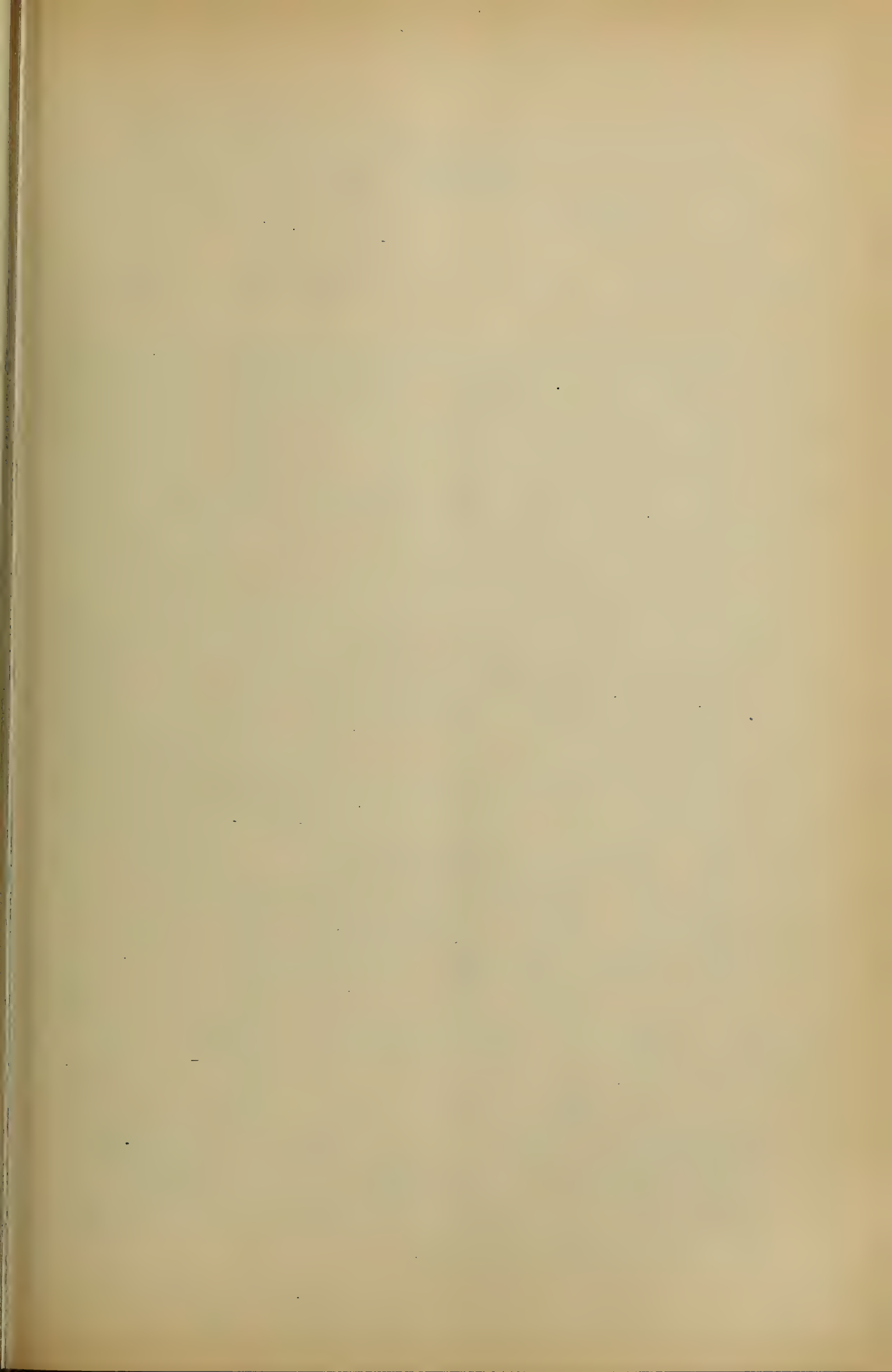
In testimony whereof I have signed this specification in the presence of two subscrib- 15
ing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

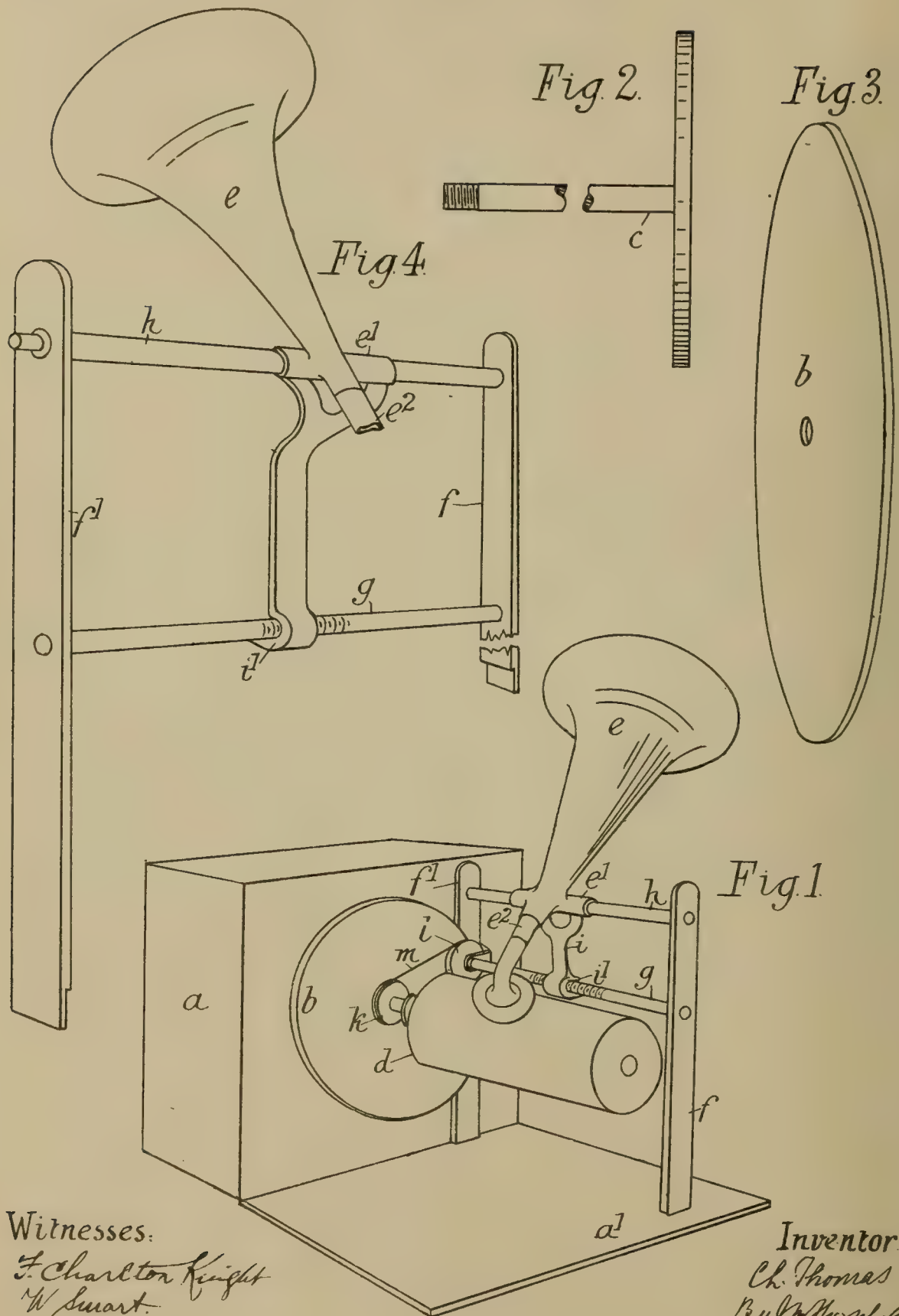
C. A. GIBNER.



No. 842,982.

PATENTED FEB. 5, 1907.

C. THOMAS.
TALKING MACHINE.
APPLICATION FILED DEC. 15, 1905.



Witnesses:

F. Charlton Knight
W. Stuart.

Inventor.

Ch. Thomas
By J. M. Marshall
Atty.

UNITED STATES PATENT OFFICE.

CHARLES THOMAS, OF NEWTON ABBOT, ENGLAND.

TALKING-MACHINE.

No. 842,982.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed December 15, 1905. Serial No. 291,840½.

To all whom it may concern:

Be it known that I, CHARLES THOMAS, a subject of the King of England, residing at Newton Abbot, Devon, England, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention has for its object the provision of certain mechanical devices which will enable a gramophone or disk-recording machine to be readily used for producing phonograph or cylinder records.

The accompanying drawings show how I carry the invention into effect.

Figure 1 is a perspective view of a combined gramophone and phonograph provided with a frame carrying the horn and an Edison worm. Fig. 2 is a side view of the turn-table. Fig. 3 is a perspective view of a record-disk. Fig. 4 shows a separate view of the frame.

Similar letters refer to similar parts throughout the several views.

With the object in view I take an ordinary gramophone provided with the usual case *a* containing the internal driving mechanism, a cover *a'*, and record-disk *b*. To the turn-table *c* is fixed a stem having a screw-threaded outer end, to which the mandrel *d* is secured, so that the latter is operated direct by and with the turn-table.

The mechanism which enables me to use the same horn *e* and an appropriate support therefor without removing any parts from or attaching same to the apparatus for operating with a disk or a cylinder consists of a frame constructed of two standards *f f'*, fitted with an Edison worm *g* and a guide-spindle *h*. The horn *e* is fitted with a sleeve *e'*, capable of sliding along the spindle *h*. Connected with said sleeve is an arm *i*, whose free end *i'* is formed into a screw-threaded claw to mesh with the worm *g* and be driven thereby, the worm receiving motion from the turn-table *c* through the intervention of pulleys *k* and *l* and driving-strap *m*. The frame is mortised in the open lid *a'* of the box, and the guide-spindle *h* projects into a hole in the top of the box *a*. The standard *f'* is disposed underneath the turn-table.

For use as a phonograph the apparatus is turned on edge, as indicated in Fig. 1, so as to place the cylinder in a horizontal position. The horn *e* and its arm *i* are so adjusted as to insure the necessary contact of the recorder or reproducer with the cylinder. For further security I connect the reproducer with the horn by a rubber sleeve or socket *e²*.

When using the apparatus as a gramophone, the box *a* is placed in its normal position, the strap *m* is thrown off, and the sleeve of the horn is allowed to come on to the inner face of the standard *f'*, while the claw *i'* is disengaged from the worm *g*. The reproducer is then adjusted upon the face of the disk. It is to be mentioned that the sleeve *e'* is of such a length as to suit the position of the reproducer on the disk.

I am aware that prior to my invention, convertible phonographs and gramophones have been made, but the mechanisms provided for the purpose consisted of separate or additional means that required detaching and readjusting in different positions for use with each type of apparatus, while by my invention the same parts will serve throughout in substantially the same position, the distinguishing feature being that the mechanism in its normal position serves as gramophone, but being converted for use as a phonograph by standing on edge. I therefore do not claim the combination of the two types of machine broadly; but

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A convertible gramophone and phonograph comprising a gramophone turn-table, a spindle upon which said turn-table rotates, a phonograph-mandrel detachably mounted upon said spindle, a reproducer for operation relatively either of said parts and means for feeding said reproducer, as set forth.

2. In a convertible gramophone and phonograph, the combination with a gramophone turn-table, its spindle and detachable phonograph-mandrel mounted on said spindle, of a frame comprising two standards secured in the cover of the phonograph-box, an Edison worm journaled in said standards, a guide-

spindle fixed in the standards, a horn having
a sleeve mounted on said guide-spindle, a
claw-arm fast on the horn and engaging the
Edison worm, a reproducer at the end of the
5 horn, and gear for driving the Edison worm
from the turn-table, as set forth.

In testimony whereof I have signed my

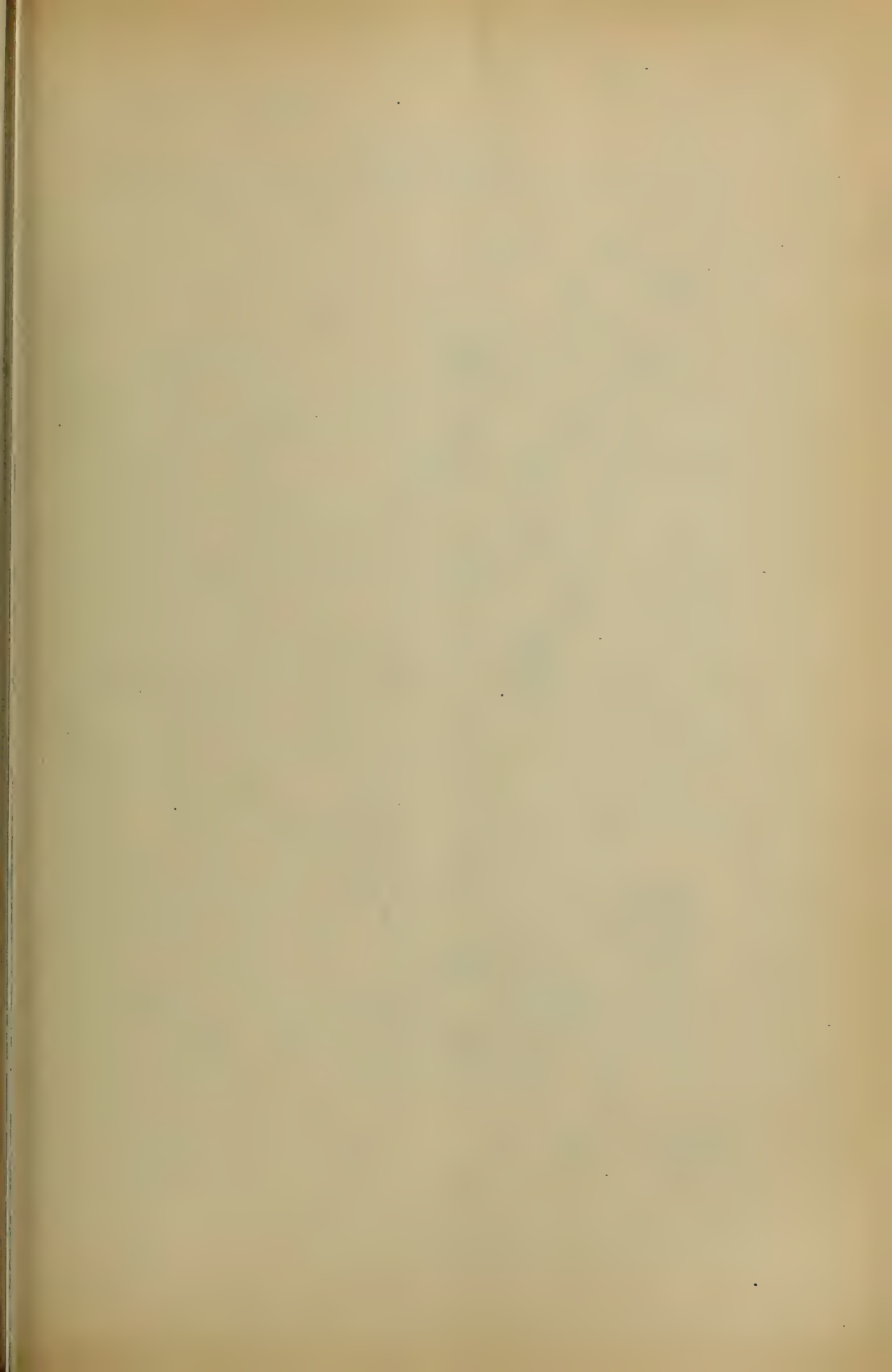
name to this specification in the presence of
two subscribing witnesses.

CHARLES THOMAS.

Witnesses:

W. J. HOLE,

E. J. EDMONDS.



C. THOMAS.
TALKING MACHINE.
APPLICATION FILED MAY 14, 1906.

Fig. 1.

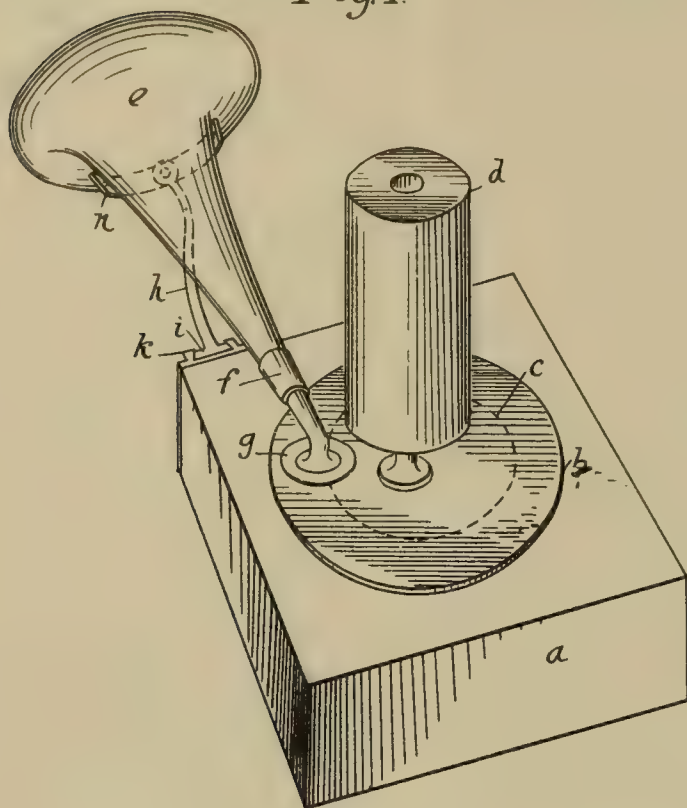


Fig. 3.

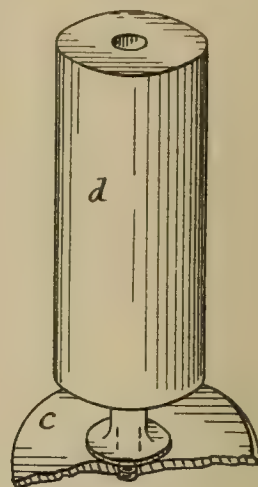


Fig. 4.

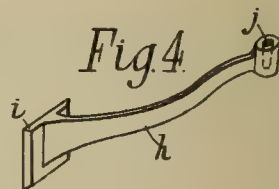


Fig. 2.

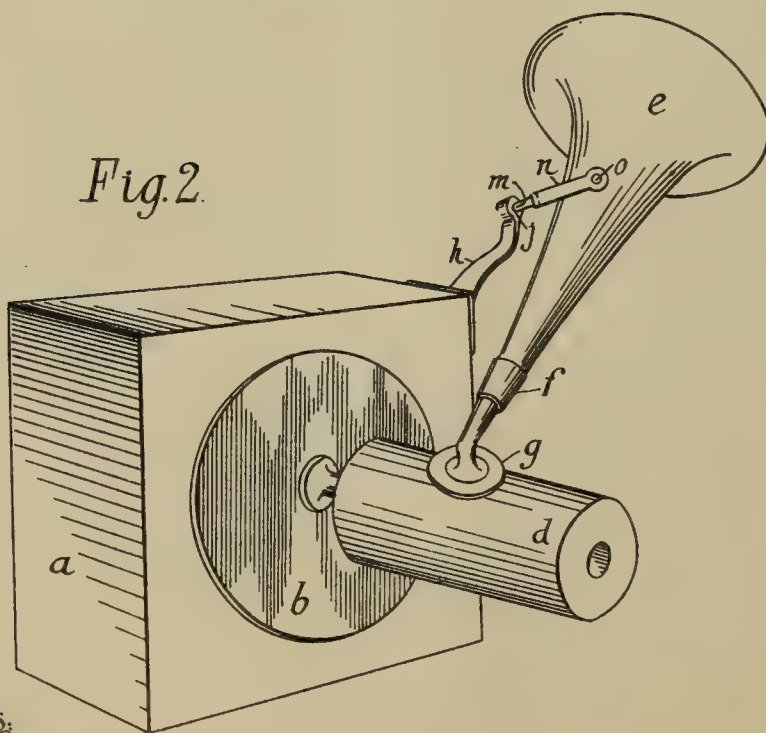
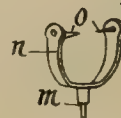


Fig. 5.



Fig. 6.



Witnesses:
W. Smart,
L. Chatwin.

Inventor:
Ch. Thomas.
By J. M. Howchell
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES THOMAS, OF NEWTON ABBOT, ENGLAND.

TALKING-MACHINE.

No. 842,983.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed May 14, 1906. Serial No. 316,848.

To all whom it may concern:

Be it known that I, CHARLES THOMAS, a subject of the King of England, residing at Newton Abbot, county of Devon, England, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

The object of my invention is to render gramophones or disk sound-reproducing machines convertible for use as phonographs or cylinder-machines without practically having to secure to the former any other part than the cylindrical mandrel for carrying the record-cylinders.

A further object is to provide a simple detachable means for the aforesaid purpose, such means being practically necessary parts of an ordinary gramophone, but particularly constructed or fashioned to suit the convertible machine, and thus avoiding an increase in the sale price of talking-machines.

I obtain this object by the means illustrated in the accompanying drawings, in which all the figures are shown in perspective, and the following is a short statement of the same: Figure 1 shows a gramophone provided with a detachable supporting-arm and pivoted bracket for the horn. Fig. 2 shows the same apparatus disposed for use as a phonograph. Fig. 3 shows the mandrel. Fig. 4 shows the detachable arm. Fig. 5 shows a fixed base-plate for said arm. Fig. 6 shows the pivoted bracket.

Similar letters refer to similar parts throughout the several views.

The case *a* and inclosed driving mechanism are of ordinary construction, while the disk *b* represents an ordinary gramophone-record. The turn-table *c* is formed with an external central hole which is tapped to receive the stem of a mandrel *d*, and thus combine the latter direct with the turn-table and drive both in a definite manner by the ordinary clock-work and without other intervening gear.

The horn *e* is of ordinary form, with its

flexible union *f* and sound-box *g*. The horn is supported near its trumpet end or flaring mouth in such a manner as to allow it to travel with equal facility over the flat surface of a disk and along the peripheral surface of a cylindrical record, it being merely necessary to stand the apparatus either upright or on its side, according to its use as a gramophone or a phonograph, respectively.

The support for the horn consists of three distinct parts—viz., a detachable arm *h*, formed with a base-plate *i* and a socket *j*. The base-plate can be firmly seated in a box-plate *k*, having for this purpose undercut guide-ledges *l*, and which plate is firmly fixed to the case *a* by screws or the like. The socket *j* at the free end of the arm *h* is formed with a central hole adapted to receive the stem *m* of a bow-shaped holder *n*, which serves as a swivel for the horn, which is retained in said support by means of centering-pins *o*, fixed in the bow-shaped arms of the support and entering appropriate indentations in the sides of the horn.

I wish it to be understood that I do not claim, broadly, a convertible gramophone and phonograph talking-machine, as such combinations are known; but

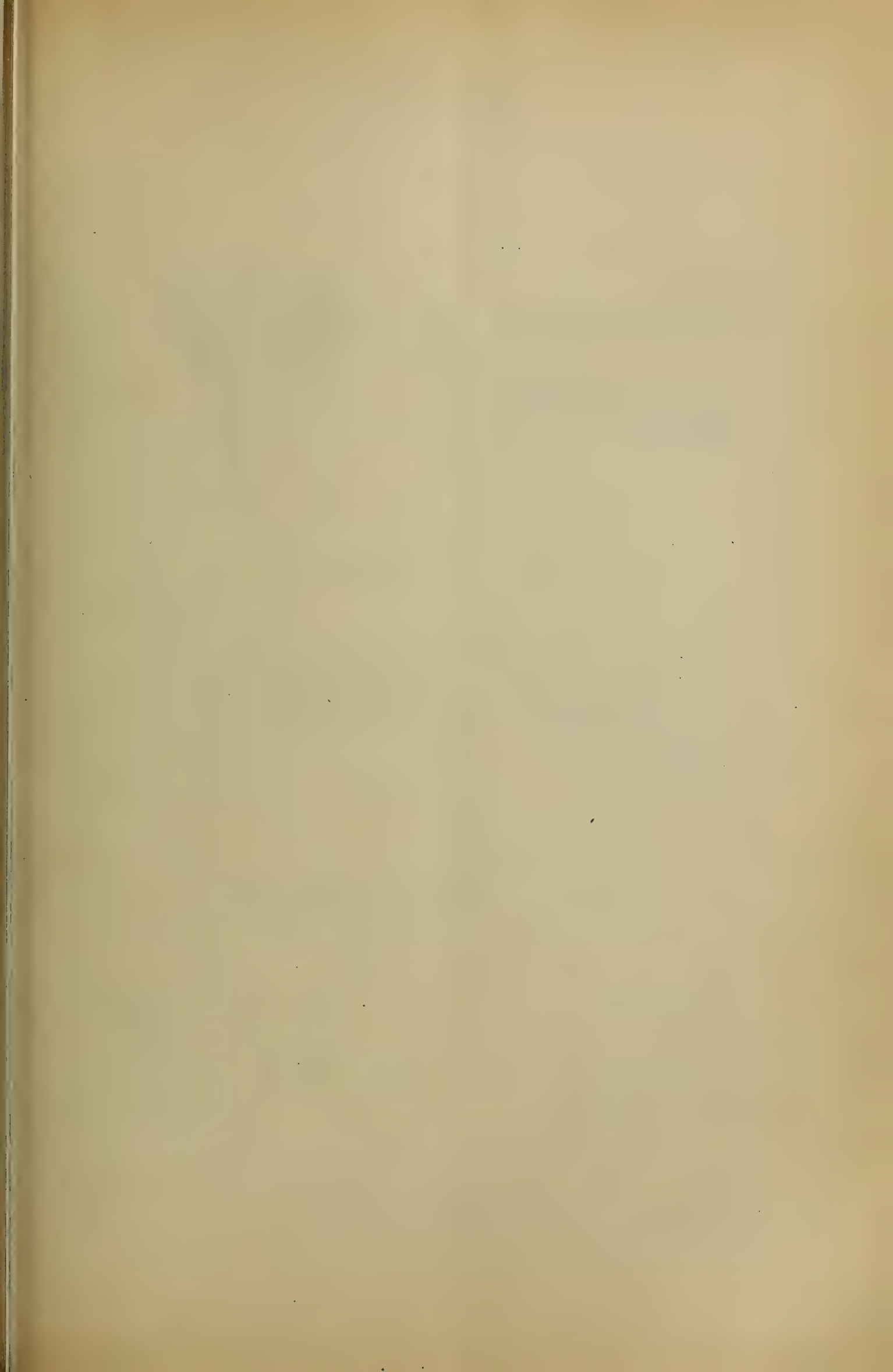
What I do claim as my invention, and desire to secure by Letters Patent of the United States, is—

In a convertible gramophone and phonograph the combination with the mandrel directly attached to the turn-table, of a horn-supporting arm, a box-plate for said arm fixed to the case of the machine, a swiveling bow-holder secured to the arm, a horn secured in said holder, a flexible union at the end of the horn and a sound-box with reproducer secured in said union, as and for the purpose described.

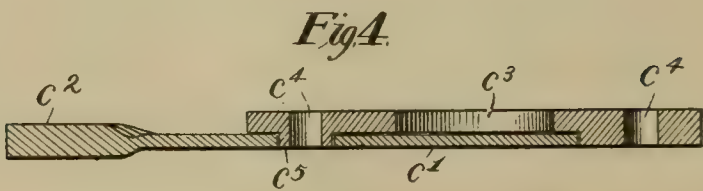
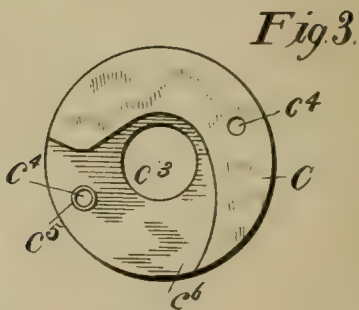
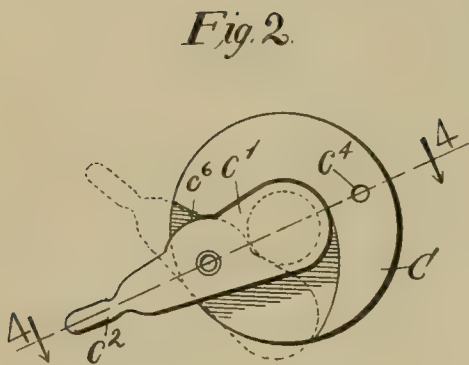
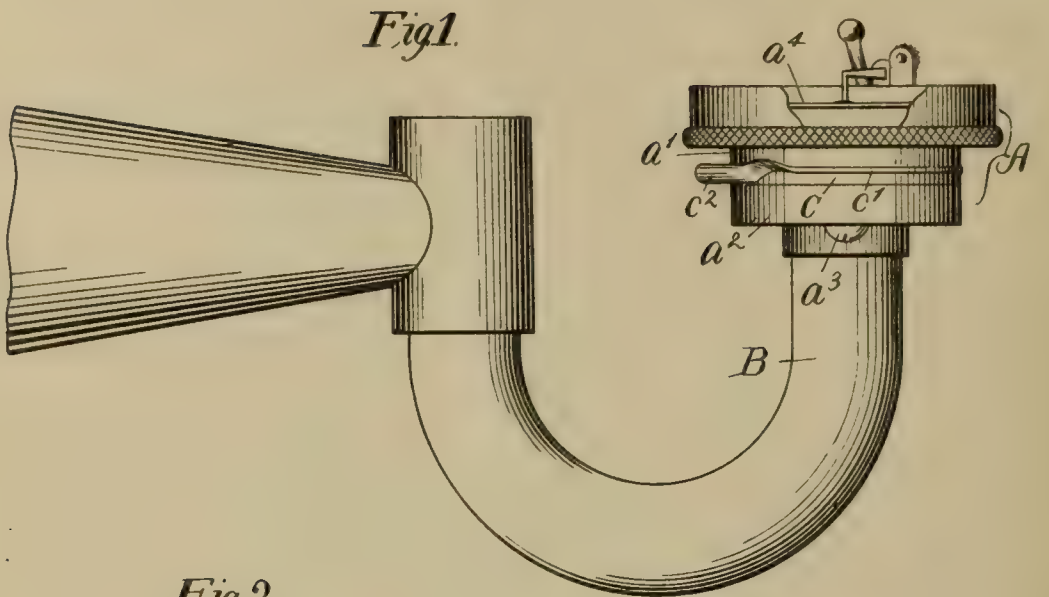
CHARLES THOMAS.

Witnesses:

JOHN FURNEAUX GRIBBLE,
DAVID KENNETH WATSON.



F. SHEPPY.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED DEC. 11, 1905.



Witnesses:

C. F. Bassett
W. A. Milord

Inventor
Frederick Sheppy
By Frederick Benjamin
Att'y.

UNITED STATES PATENT OFFICE.

FREDERICK SHEPPY, OF CHICAGO, ILLINOIS.

SOUND-BOX FOR TALKING-MACHINES.

No. 843,042.

Specification of Letters Patent.

Patented Jan. 5, 1907.

Application filed December 11, 1905. Serial No. 291,188.

To all whom it may concern:

Be it known that I, FREDERICK SHEPPY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention relates to means for controlling the volume of sound produced in the sound-box of a talking-machine, thus giving variety in expression and modifying the tones.

The sounds produced by talking-machines are in many instances too loud for small rooms, causing echoes which mar the distinctness of utterance, and efforts have been made to avoid this difficulty by placing sound-muffling devices in the necks of the horns, which form features of such machines. It has been found that while such devices muffle the tones produced in the sound-box, they also impair the musical quality of the tones, giving them a harsh or metallic character, probably due to the fact that the metallic walls of the horn become in a measure sound-boards against which the sound-waves are projected by the checking or interruption caused by the muffling devices used. In my invention I have avoided this difficulty by modifying the sound-box itself, so that the waves are formed before passing to the neck of the horn.

In the accompanying drawings I have illustrated a preferred adaptation of my invention in the following views:

Figure 1 is a view in elevation of a sound-box, the attached gooseneck, and a portion of the horn, of a well-known form of sound-reproducing machine. Fig. 2 is a plan view of my improved sound-modifying attachment for sound-boxes. Fig. 3 is a plan view of a portion of the device shown in Fig. 2, and Fig. 4 is an enlarged section on the line 4 4 of Fig. 2.

Referring to the details of the drawings, A represents generally the sound-box of a talking-machine, and B the gooseneck, to which the sound-box is secured in any approved manner. In its general form and construction the sound-box is of a well-known type and need not be particularly described, except as to those parts which are modified to provide for my attachment. The box is made of the section in which the diaphragm a^4 is secured and of two concentric rings a' a^2 ,

the inner sides of which form the sound-chamber, which receives the tones directly from the diaphragm. These rings are secured together by screws a^3 , and between them is placed a plate C, which is clamped closely by the opposing faces of the rings. In the center of the plate is formed an opening c^3 , and on opposite sides of the central opening are screw-holes c^4 , through which the screws a^3 pass. In one of the holes c^4 a collar c^5 is secured, which forms a tubular bearing for the pivotally-mounted shutter c' . This shutter is mounted in the countersunk portion c^6 of the plate C, so that the outer face of the shutter may be flush with the corresponding face of the plate. The inner end of the shutter is adapted to cover the opening c^3 when the shutter is in the position shown in full lines in Fig. 2 and to entirely uncover same when in the position shown by dotted lines in said figure. Between these two extreme positions the shutter may be moved to cover or uncover any portion of the area of said opening. The shutter is formed with a projecting neck, as c^2 , at its outer end, which is adapted to be grasped by the fingers of the person operating the machine. The opposed faces of the plate C and the ring a' hold the shutter in close frictional engagement with the face of the plate C, so that no matter what adjustment of the shutter is made friction alone will be sufficient to hold it in position until moved by hand.

By placing the shutter in close proximity to the diaphragm and within the walls of the sound-box it will be apparent that the sound-waves are affected almost at their inception, and it is to this condition that the great utility of my invention is due.

Having thus described my invention, what I claim is—

1. In a phonographic sound-box comprising a diaphragm and a sound-chamber, a plate secured in said box and extending across said chamber, said plate having an opening therein for the passage of sound-waves, a shutter pivotally mounted on said plate, and adapted to be adjusted edgewise to control the opening in said plate, and having a grasping portion extending beyond said sound-box.

2. In a phonographic sound-box comprising a diaphragm and a sound-chamber, a plate secured in said box and extending across said chamber adjacent to the diaphragm, said plate having an opening there-

in for the passage of sound-waves, and a recessed portion in one of its faces, a shutter pivotally mounted in the recess of said plate and adapted to be adjusted edgewise to control the opening in said plate, and having an extension projecting from the sides of said sound-box.

3. In a phonographic sound-box comprising a diaphragm and a sound-chamber, a plate secured in said sound-box and having an opening therein for the passage of sound-waves, a shutter pivoted on said plate at the upper side of said sound-box and adapted to be moved edgewise to control the opening in said plate, said shutter having a grasping portion extending beyond the upper side of said sound-box.

4. In a phonographic sound-box comprising a diaphragm and a sound-chamber, a plate secured to said sound-box and extending transversely of said chamber, said plate having a sound passage-way therein and a recessed portion, a shutter pivoted on said

recessed portion of plate and adapted to be moved edgewise to control the opening in said plate, said shutter having a grasping portion projecting beyond the sound-box, and said plate adapted to limit the pivotal movements of said shutter.

5. In a phonographic sound-box comprising a diaphragm, a sound-chamber and a sound passage-way, a shutter adjustably pivoted in said sound-box at a point eccentric to said passage-way, said shutter adapted to control the sound passage-way and to be held in its adjusted positions by frictional engagement with portions of the sound-box, means for adjusting said shutter and means for limiting the pivotal movements of the shutter.

In testimony whereof I affix my signature in presence of two witnesses.

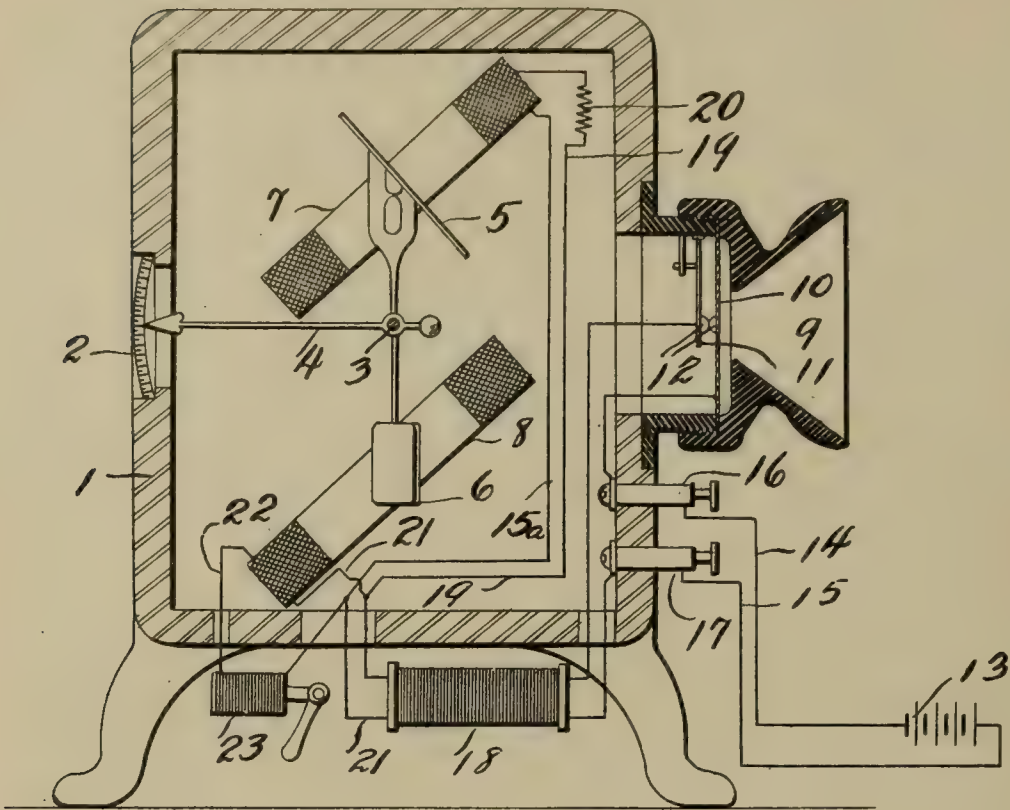
FREDERICK SHEPPY.

Witnesses:

F. BENJAMIN.

DENNIS K. LINDHOUT.

L. R. WHEELER.
DEVICE FOR REGISTERING VIBRATIONS OF MUSICAL SOUNDS.
APPLICATION FILED DEC. 6, 1906.



Witnesses

Chas. H. Davis.
John D. Davis

By

Shepherd Barker

Attorney

Inventor
Lewis R. Wheeler

UNITED STATES PATENT OFFICE.

LEWIS R. WHEELER, OF TACOMA, WASHINGTON.

DEVICE FOR REGISTERING VIBRATIONS OF MUSICAL SOUNDS.

No. 844,838.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed December 6, 1906. Serial No. 346,634.

To all whom it may concern:

Be it known that I, LEWIS R. WHEELER, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Devices for Registering Vibrations of Musical Sounds, of which the following is a specification.

This invention is a new and useful apparatus for indicating the pitch or frequency of vibrations of sounds, and it is particularly designed for use in tuning musical instruments.

The invention embodies means for indicating by a pointer and scale or dial the exact number of vibrations in any tone or sound ranging between the number of vibrations distinguishing mere noise and the number of vibrations distinguishing music—that is, between about twenty vibrations per second minimum and in general practice four thousand one hundred vibrations per second maximum.

The invention primarily aims to provide an apparatus which will generate a current of electricity having a frequency or number of alternations per second proportional to the frequency of vibrations of a given vibrating string, column of air, or other sonorous body.

The invention further aims to provide, in combination with the above-named means, means for determining the frequency of said current and for visibly indicating the same.

The invention further aims to provide a scale calibrated chromatically, so that the indicator will disclose the exact pitch of any musical sound, so that in practical use any one familiar with the nature and use of the instrument can readily tune the most difficult instrument without experience or knowledge of music, no matter how little ear for music such person may have.

The detailed construction will appear in the course of the following description, in which reference is had to the accompanying drawing, forming a part of this specification, like numerals designating like parts.

The figure illustrates a longitudinal vertical section of a device constructed in accordance with my invention and shows diagrammatically the various electrical connections.

In the practical embodiment of my invention I employ a suitable casing 1, provided in its rear wall with a calibrated scale 2, marked off with the letters of the chromatic scale or number of vibrations per second cor-

responding thereto. A shaft 3 is journaled in pivot-bearings (not shown) in the casing 1, and upon said shaft is fixed a balanced indicator-hand 4, which is provided on each side thereof with rigidly-secured armatures 5 and 6. The armatures 5 and 6 are designed to be attracted by respective magnets 7 and 8, disposed adjacent thereto and in their movement in either direction to move the hand correspondingly. In the front of the casing 1 is mounted a sound-receiver 9 of any approved type for the functions contemplated, a receiver of the Berliner-transmitter type being arbitrarily shown for convenience of illustration and description. Such receiver is provided with a diaphragm 10 and a vibrating spring 11, the diaphragm 10 and spring 11 being provided with the carbon hemispheres 12 in spring-pressed contact with each other.

For the purpose of generating a primary current a battery 13 is provided, from which lead wires 14 and 15. The wire 14 passes through a binding-post 16 and has connection with the diaphragm 10. The wire 15 passes through a binding-post 17 and the primary winding of an induction-coil 18, from whence it leads to the vibrating spring 11. The vibrations of the diaphragm 10, it will be understood, serve to induce currents in the secondary coil of the inductorium 18 by virtue of the variation in resistance between the carbon hemispheres 12. The frequency of the alternations of the current in the induced circuit of the coil will be directly proportional to the frequency of the vibrations of the sound received by the diaphragm.

From the secondary winding of the induction-coil 18 a wire 21 leads to the electromagnet 8, from which a return-wire 22 leads back to the secondary winding of the induction-coil 18 through an inductive resistance 23. The electromagnet 7 is shunted into the said secondary circuit by wires 15^a and 19, leading from the wires 22 and 21, respectively. The wire 19 leads from the magnet 7 through an anti-inductive resistance 20 and from said resistance to the wire 21.

In the practical use of the instrument the electromagnets 7 and 8 tend to rotate the shaft 3 in opposite directions by reason of their influence upon the armatures 5 and 6, respectively. They are so arranged that when the shaft rotates in one direction the torque of the magnet which tends to rotate it decreases and the torque of the other mag-

net increases. Under the influence of the two magnets the shaft will take a position where the torques are equal. If the torque of one magnet varies, the shaft takes up another position determined by the balance of the two forces. The resistance in series with one of the magnets is, as above stated, inductive and the other resistance is non-inductive. Any change in the frequency of the circuit will therefore unbalance the forces acting upon the shaft and bring the shaft as well as the pointer connected to the shaft to a new position, such new position being arbitrarily arranged to bear a direct relation to and to indicate directly the pitch or number of vibrations per second of the sound produced in the neighborhood of the receiver 9.

It will therefore be seen from the foregoing description that the action of the magnets upon the armatures corresponds to the action of a frequency-meter and that the disclosure is purely arbitrary as regards this feature. Any form of frequency-meter capable of performing the functions contemplated may be advantageously employed, it being understood that the invention consists, essentially, in the idea of tuning instruments in accordance with the indicated strength of an alternating current corresponding in frequency with the frequency of the sound-vibrations.

While the elements herein shown and described are well adapted to serve the functions set forth, it is obvious that various minor changes may be made in the proportions, shape, and arrangement of the several parts without departing from the spirit and scope of the invention as defined in the appended claims.

Having fully described my invention, I claim—

1. A device of the character described comprising an inductorium, a variable-resistance

sound-receiver in circuit with the primary coil thereof and means in circuit with the secondary coil to indicate relative changes in the frequency of alternations of the secondary current. 45

2. A device of the character described comprising an inductorium, a variable-resistance sound-receiver in circuit with the primary coil thereof, means in circuit with the secondary coil adapted to indicate the relative frequency of alternations of the secondary current and a scale associated with said last-named means calibrated to indicate the said relative frequency of the alternations in terms corresponding to the number of vibrations per second of sound received in the said receiver whereby the pitch of said sound is indicated on the said scale. 50 55 60

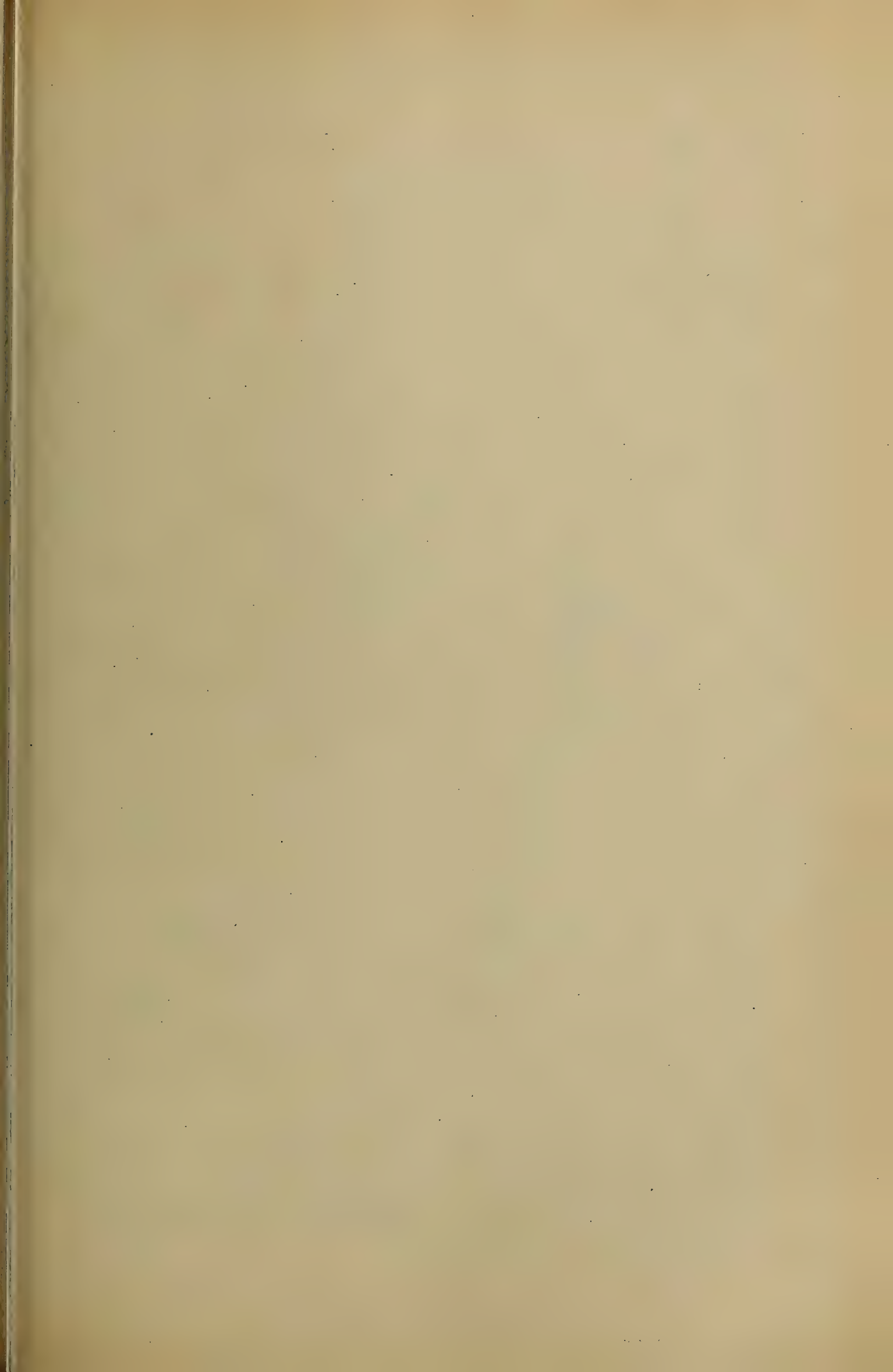
3. A device of the type set forth comprising an inductorium, a variable-resistance sound-receiver in circuit with the primary coil thereof, a shunt-circuit connected with the secondary coil of said inductorium and having an anti-inductive resistance therein, a second shunt-circuit similarly connected and having an inductive resistance therein, electromagnets in each of said secondary circuits, pivoted armatures rigidly secured together and arranged adjacent the said magnets and adapted for movement with relation thereto corresponding to the frequency of the current passing through said magnets, an indicating-hand controlled by the movement of said armatures and a calibrated scale associated with said hand. 65 70 75

In testimony whereof I affix my signature in presence of two witnesses.

LEWIS R. WHEELER.

Witnesses:

L. H. HIGGINS,
J. L. COATES.



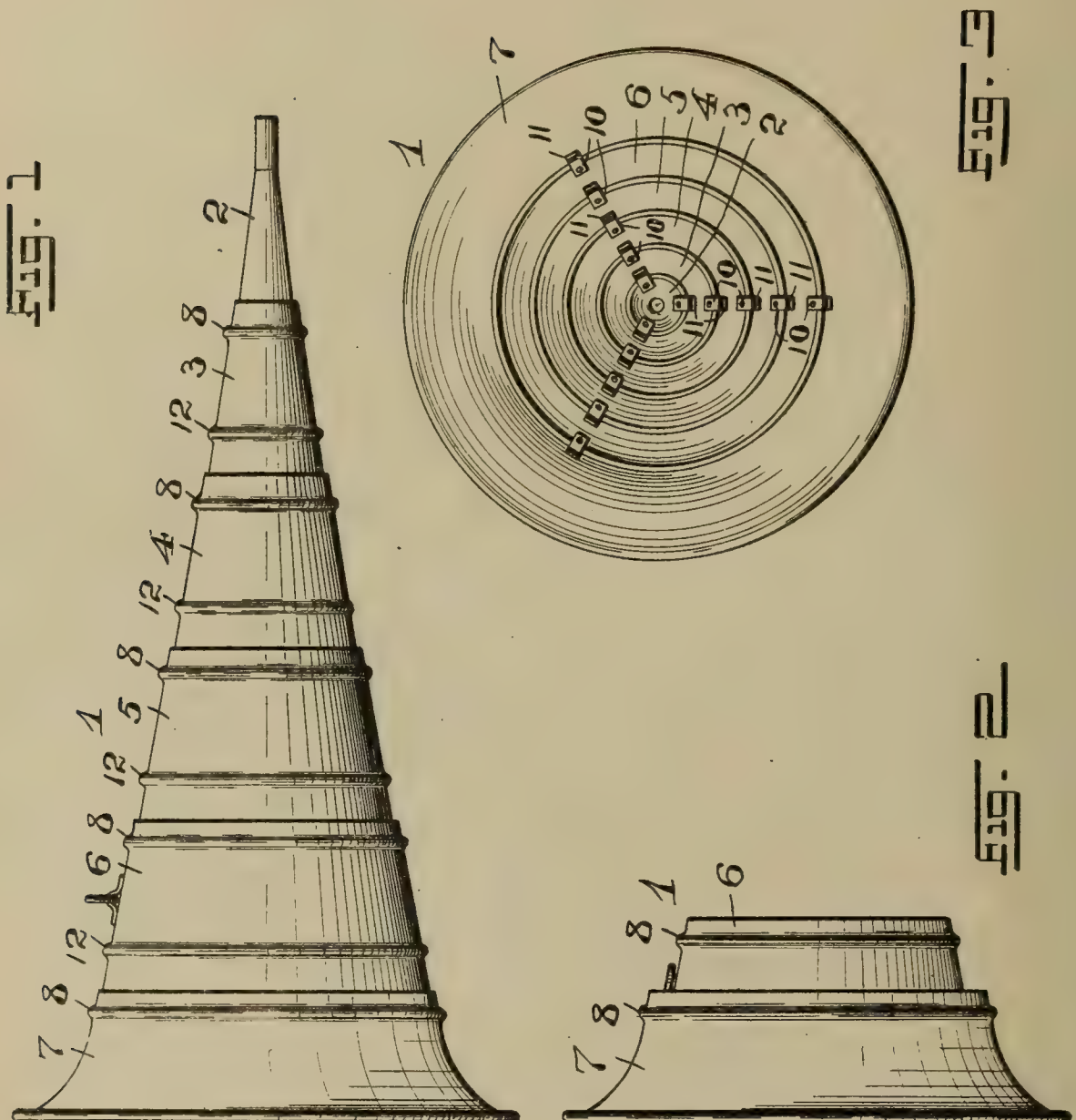
No. 845,007.

PATENTED FEB. 19, 1907.

A. MAURER.
PHONOGRAPH HORN.

APPLICATION FILED MAY 22, 1906.

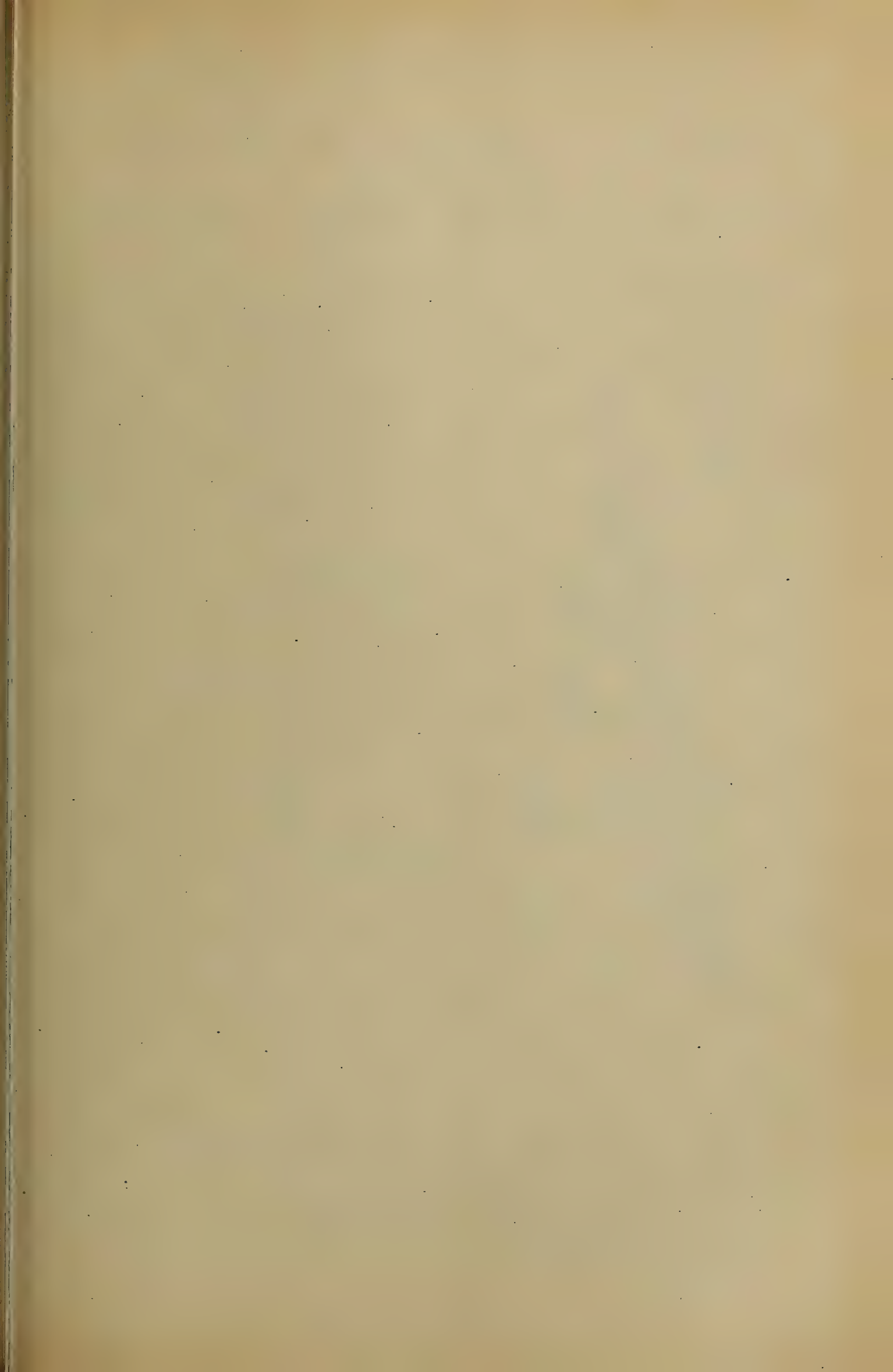
2 SHEETS—SHEET 1.



WITNESSES:
Evelyn R. Lesser
Frederick Jamison



INVENTOR:
Fisher Maurer
BY
Fraentzel and Richards
ATTORNEYS.

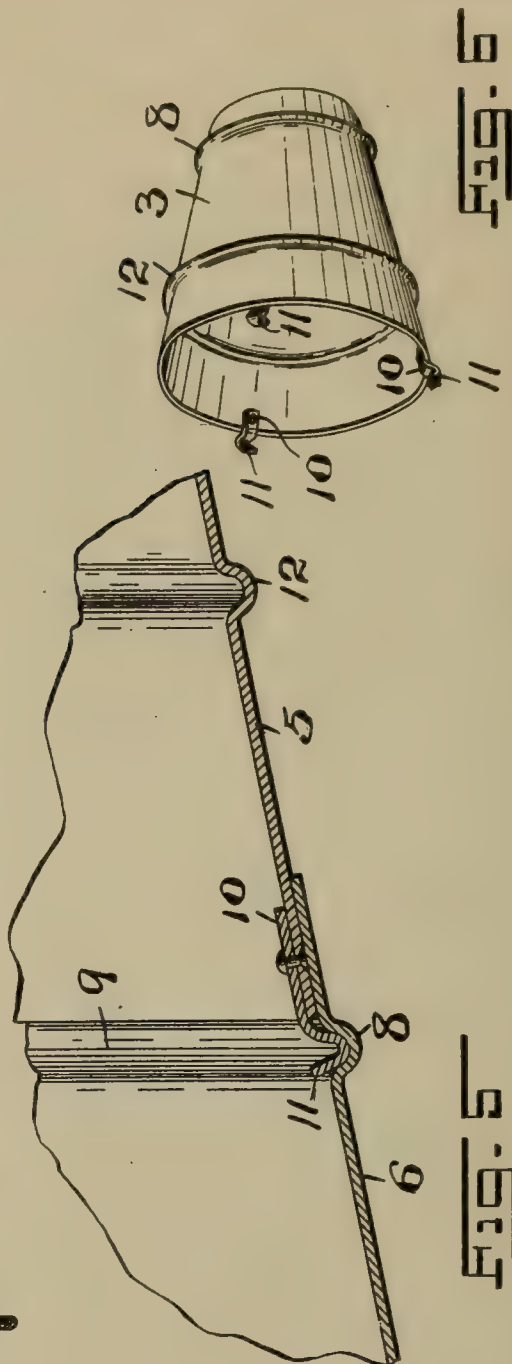
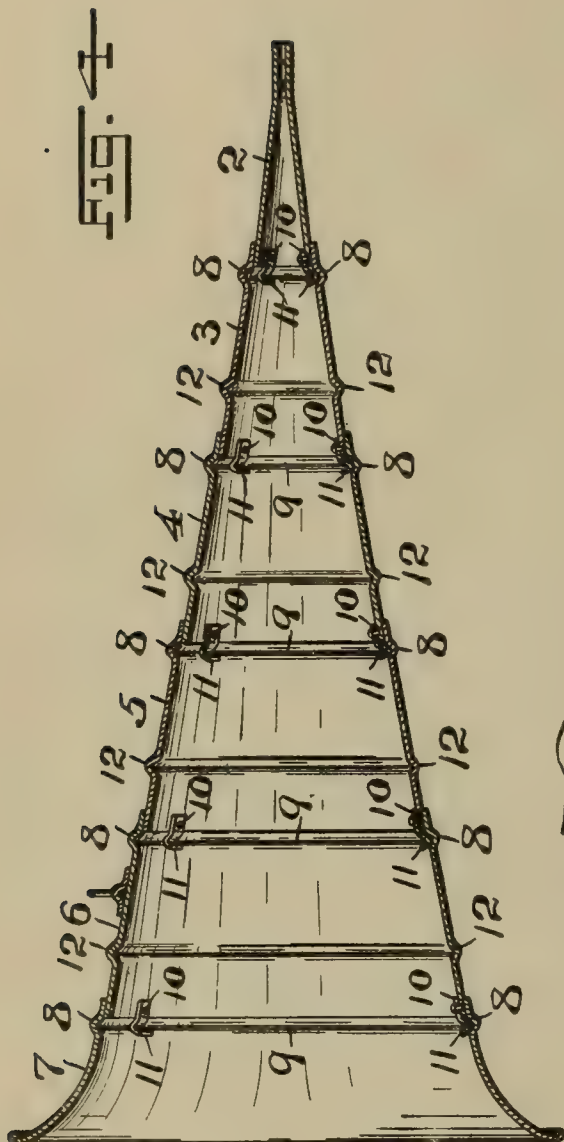


No. 845,007.

PATENTED FEB. 19, 1907.

A. MAURER.
PHONOGRAPH HORN.
APPLICATION FILED MAY 22, 1906.

2 SHEETS—SHEET 2.



WITNESSES:

Ernest R. Lesser
Frederick Jamison

INVENTOR:

Fisher Maurer

BY

Fraentzel and Richards,
ATTORNEYS.

UNITED STATES PATENT OFFICE.

ASHER MAURER, OF NEWARK, NEW JERSEY.

PHONOGRAPH-HORN.

No. 845,007.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed May 22, 1906. Serial No. 318,319.

To all whom it may concern:

Be it known that I, ASHER MAURER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates generally to improvements in amplifying-horns for phonographs and similar sound-reproducing machines; and the present invention relates more particularly to a novel construction of horn comprising a number of collapsible horn-sections which can be nested one within the other to produce a very small package for carrying purposes, but which sections can be brought in an extended relation to produce a horn of the ordinary conformation ready for use. To accomplish this main purpose of the present invention, the horn-sections are provided with binding means or friction devices arranged on one horn-section and adapted to engage with portions of another horn-section, whereby the parts are brought in positive holding engagement to provide a rigid horn.

This invention, therefore, has for its principal object to provide a phonograph-horn of the general character hereinafter more fully described, and, furthermore, to provide a collapsible amplifying-horn the horn-sections of which may be quickly brought into their extended and rigidly-connected relation to produce a horn ready for use, but which can be just as quickly separated, so as to be brought into their nested relation to provide a package of very small size.

Other objects of this invention not at this time more particularly mentioned will be clearly understood from the following detailed description of the same.

With the various objects of my present invention in view the said invention consists in the amplifying-horn hereinafter set forth; and, furthermore, this invention consists in the general arrangements and combinations of the devices and parts, all of which will be more fully described in the following specification, and then finally embodied in the

clauses of the claim which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a horn embodying the principles of the present invention, the horn-sections being shown in their extended and rigidly-connected relation. Figure 2 is a similar view of the horn, showing the horn-sections in their collapsed or nested relation; and Figure 3 is an end view of the horn shown in Fig. 1 looking in the direction of the arrow X in said figure. Figure 4 is a longitudinal vertical section of the horn shown in said Fig. 1. Figure 5 is a detail vertical section of portions of two of the adjacent horn-sections and one of the clamping or holding devices between said sections, and Figure 6 is a perspective view of one of the said horn-sections.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates the complete horn, the same in the present construction comprising a number of collapsible horn-sections 2, 3, 4, 5, 6, and 7, six of such horn-sections being shown in the present construction; but it will be evident that more or less horn-sections may be used, according to the different sizes of the horns. The said several horn-sections being made from sheet metal and in the shapes of hollow truncated cones, which are adapted to be arranged in a nested manner one within the other, substantially as shown in Fig. 2 of the drawings, are each provided at or near their smaller end portions with an outwardly-extending bead 8, forming upon the interior of each section an annular receiving depression 9, as clearly illustrated in Figs. 3, 4, and 5 of the drawings.

Suitably secured upon the inner surface and extending from the larger open end portion of each horn-section are suitably-constructed holding or clamping devices 10, preferably made from spring metal and formed at their free end portions with curved retaining portions 11, substantially as shown, which are adapted to be slipped into the annular receiving depression of the next adjacent horn-section and in this manner, there being at least two or more of such clamping devices, positively retaining the several horn-

sections in their extended and rigidly-connected relations, as will be clearly understood and as will be evident more particularly from an inspection of Fig. 4 of the drawings. Thus when the several horn-sections have been brought into their extended relation, (shown in said Figs. 1, 3, and 4 of the drawings,) then the horn can be used upon the phonograph or other similar sound-producing apparatus in the usual manner; but when removed from the machine, then by a slight pressure upon the smallest end section, as 2, the several horn-sections are readily brought into their disconnected relation, so as to become nested one within the other. Just as easily the several horn-sections are brought into their extended and connected relations by simply taking hold of the smallest end section and by a sudden pull raising the several sections from their nested positions (shown in Fig. 2) to their fixed and extended relations, (illustrated in Figs. 1 and 4,) all the holding or clamping devices being sprung into the annular depressions of the respective horn-sections to connect the several sections in their operative relations, and thereby producing the complete horn.

To provide additional strength and to prevent the distortion of the horn-sections, each section may be provided with a reinforcing bead or projection 12, as shown.

From the foregoing description it will be seen that I have provided a horn for phonographs and similar apparatus which is useful and can be made very small, so as to be carried about without inconvenience.

I claim—

1. A phonograph-horn comprising a series of collapsible horn-sections adapted to be nested when the horn is not in use, and a series of spring-clamps extending from and beyond the one open end of each section and projecting into the open end of another section each spring device being adapted to slide longitudinally of the horn in frictional binding engagement with such section, all arranged for rigidly locking the said horn-sections when extended to produce a complete horn.

2. A phonograph-horn comprising a series of collapsible horn-sections adapted to be nested when the horn is not in use, an annular receiving depression near one end of each horn-section, and means connected with the opposite end of each horn-section, said means extending from the open end of the horn-section and being adapted to extend into the open end of another section and to slide longitudinally of the horn so as to be brought in

binding engagement with the annular receiving depression for rigidly locking the horn-sections when extended to produce a complete horn.

3. A phonograph-horn comprising a series of collapsible horn-sections adapted to be nested when the horn is not in use, an annular receiving depression near one end of each horn-section, clamping devices connected with the opposite end of each horn-section and curved retaining portions on said clamping devices, said retaining portions extending from the end of the horn-section and being adapted to extend into the open end of another section and to slide longitudinally of the horn so as to be brought in binding engagement with the annular receiving depressions for rigidly locking the horn-sections when extended to produce a complete horn.

4. A phonograph-horn comprising a series of tapered tubular horn-sections, adapted to be nested when the horn is not in use, an annular reinforcing projection near one end of each horn-section, and an annular receiving depression near the other end of each horn-section, and means connected with the opposite end of each horn-section adapted to extend into the open end of another section and to slide longitudinally of the horn so as to be brought in binding engagement with the annular receiving depressions for rigidly locking the horn-sections when extended to produce a complete horn.

5. A phonograph-horn comprising a series of tapered tubular horn-sections adapted to be nested when the horn is not in use, an annular reinforcing projection near one end of each horn-section, and an annular receiving depression near the other end of each horn-section, clamping devices connected with the opposite end of each horn-section and curved retaining portions on said clamping devices, said retaining portions extending from the end of the horn-section and being adapted to extend into the open end of another section and to slide longitudinally of the horn so as to be brought in binding engagement with the annular receiving depressions for rigidly locking the horn-sections when extended to produce a complete horn.

In testimony that I claim the invention set forth above I have hereunto set my hand this 15th day of May, 1906.

ASHER MAURER.

Witnesses:

FREDK. C. FRAENTZEL,
SOLOMON FARB.

No. 845,645.

PATENTED FEB. 26, 1907.

L. D. KELLEY.
PHONOGRAPH REPEATING MECHANISM.

APPLICATION FILED SEPT. 24, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

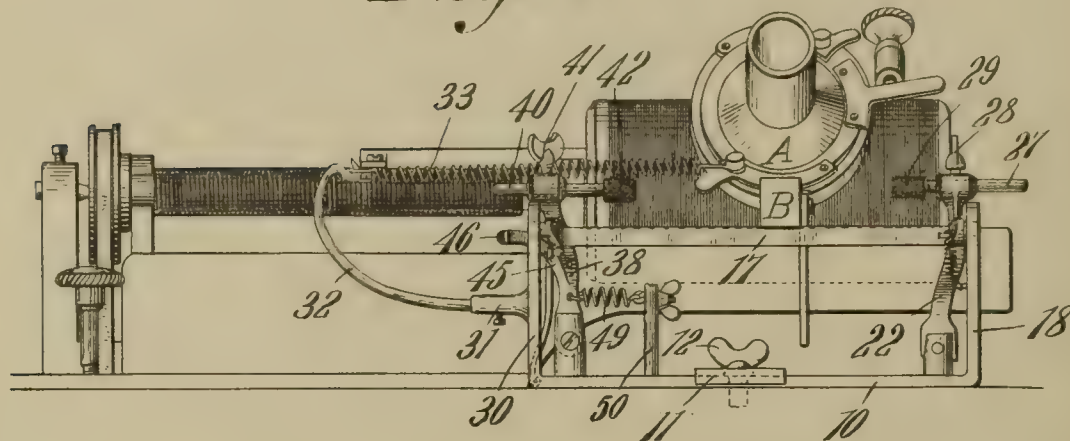
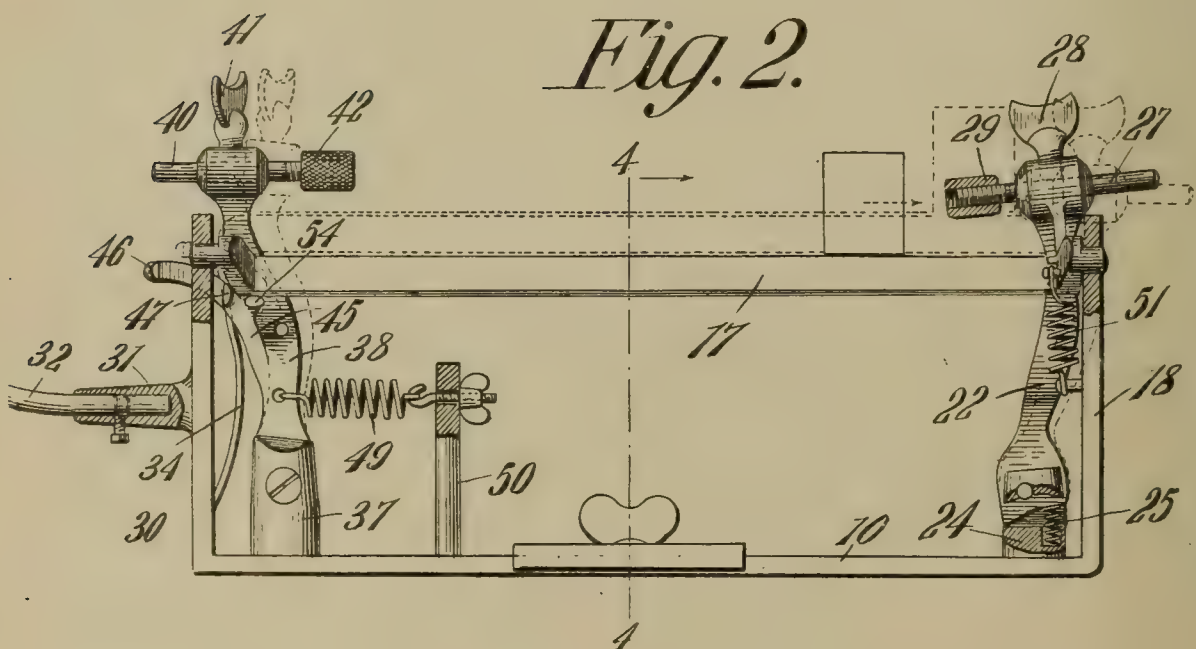


Fig. 2.

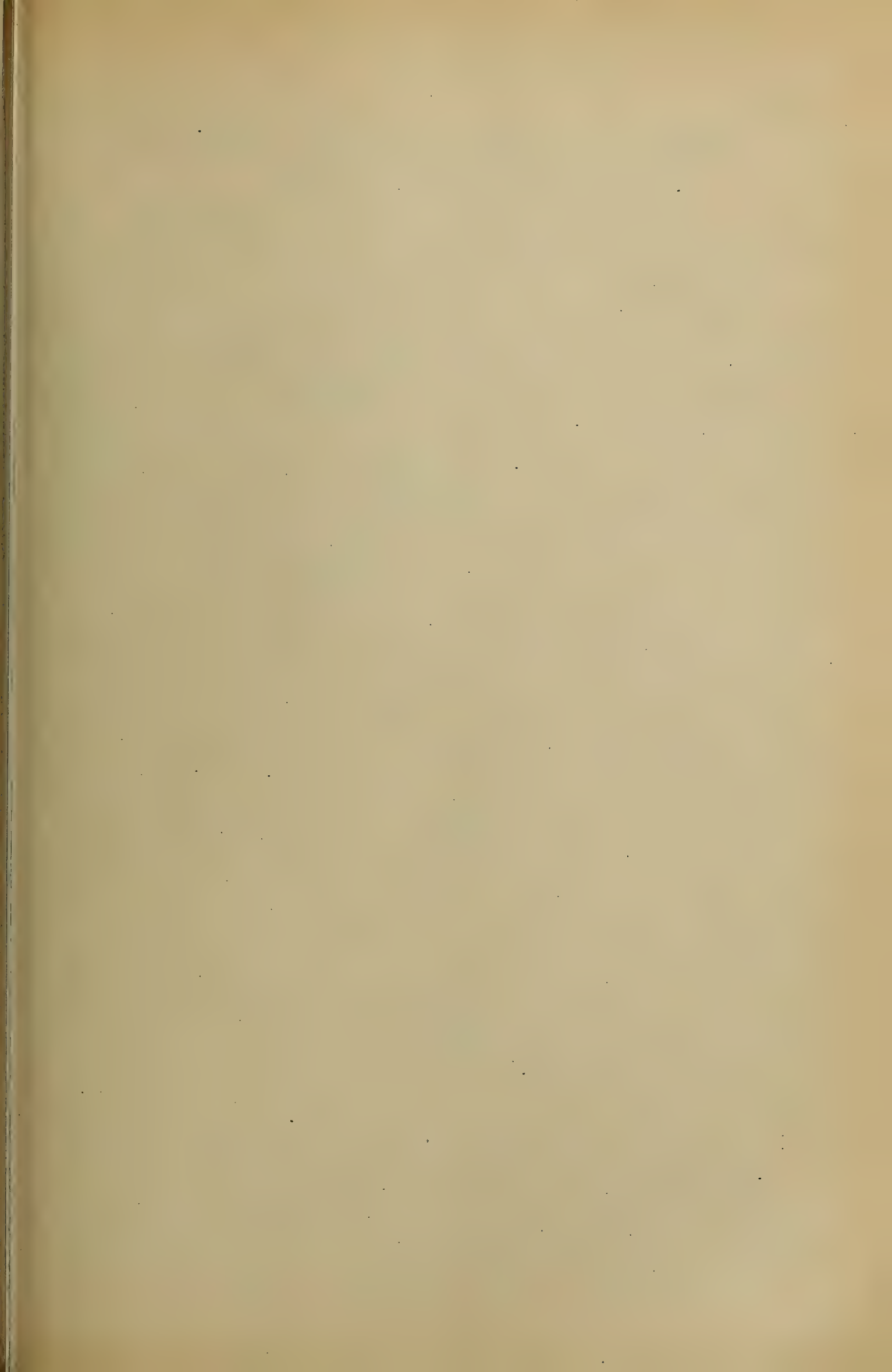


WITNESSES:

E. J. Stewart
Arthur Lawson

Lyman D. Kelley, INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS



No. 845,645.

PATENTED FEB. 26, 1907.

L. D. KELLEY.
PHONOGRAPH REPEATING MECHANISM.

APPLICATION FILED SEPT. 24, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

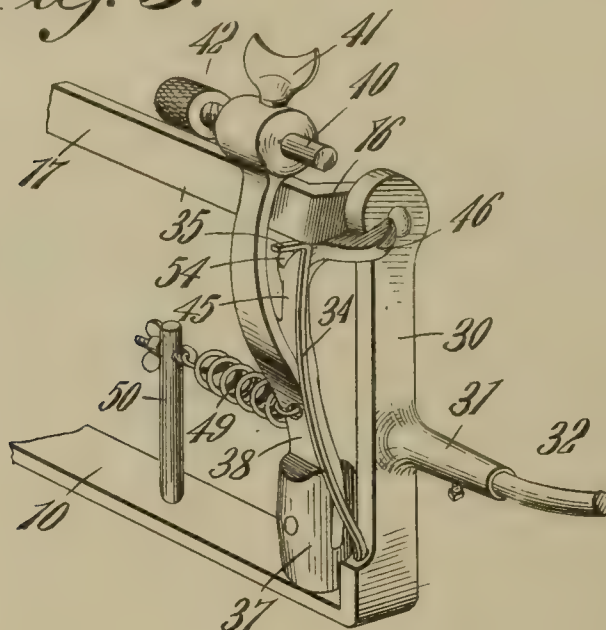
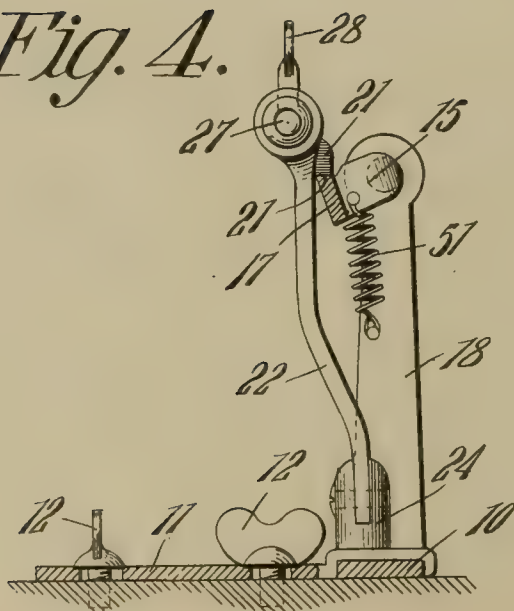


Fig. 4.



WITNESSES:

E. J. Stewart
Robert D. Lawson

Lyman D. Kelley, INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

LYMAN D. KELLEY, OF MEMPHIS, TENNESSEE.

PHONOGRAPH REPEATING MECHANISM.

No. 845,645.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed September 24, 1906. Serial No. 335,966.

To all whom it may concern:

Be it known that I, LYMAN D. KELLEY, a subject of the King of England, residing at Memphis, in the county of Shelby and State of Tennessee, have invented a new and useful Phonograph Repeating Attachment, of which the following is a specification.

The principal object of the present invention is to provide a device of simple construction for automatically effecting the repetition of reproductions of the records of phonographs and similar machines.

A further object of the invention is to provide a device of this class which may be attached to any ordinary phonograph and in which provision is made for effecting very accurate adjustment in accordance with the starting and stopping positions of the record.

A still further object of the invention is to provide a device of this type which will automatically operate to restore the sound-box carriage to initial position after the completion of each reproduction so long as there is sufficient motive power to run the machine.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a front elevation of a repeating device constructed in accordance with the invention, showing the same applied to a phonograph. Fig. 2 is a front elevation of the repeating device, parts being broken away to more clearly illustrate the construction. Fig. 3 is a detail perspective view of one end of the attachment looking from the rear. Fig. 4 is a transverse sectional view of the repeating attachment on the line 4 4 of Fig. 2.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The sound-reproducing machine shown in the drawing is of the Edison or other type and includes the usual sound-box A and sound-box carriage, having a forwardly-ex-

tending arm B, which under normal conditions is supported on a stationary guide-rail at the front of the machine.

The attachment which forms the subject of the present invention includes in its construction a substantially U-shaped frame 10, the vertical arms of which are widely separated, and the base member of this frame is held in position by a suitable clip 11, confined by thumb-screws 12, that pass through slotted openings in the clip in order to permit ready readjustment of the frame both toward and from the phonograph and in the direction of its length.

At the upper ends of the vertical arms of the frame are openings for the reception of pivot-pins that project from arms 15 and 16, which latter are connected by an integral bar 17, that forms a rest or support for the forwardly-extending arm B of the sound-box carriage.

At the right-hand end of the frame—that is to say, adjacent to the vertical bar 18 thereof—the bar 17 is provided with a slightly-angular upper edge 20, as shown in Fig. 4, for engagement by a locking-lug 21, that projects from a pivotally-mounted arm 22, this arm 22 being pivoted between two ears of a stud or bracket 24, that is carried by the base, and being normally held to the left, or in the position shown in Fig. 2, by means of a small compression-spring 25. In this the lowermost position of the bar 20 the arm B of the sound-box carriage is allowed to travel in a horizontal plane, which permits the reproducing-stylus to engage with the record and effect reproduction of such record, the carriage being moved to the right, as usual, and on arriving at the end of the record the arm B will engage the arm 22 and move the lug 21 from bar 20, permitting the latter to rise in the manner hereinafter described and to elevate with it the arm B, moving the sound-box carriage up out of reproducing position.

In order to effect the necessary adjustment for records that terminate at different points in the length of the cylinder, the upper end of the arm 22 is provided with an opening for the passage of a pin 27, which is roughly adjusted and then locked in place by a set-screw 28. The inner end of this pin is threaded and carries a nut 29, which may be turned in order to effect the very

fine adjustment essential to stop the movement of the carriage at the end of the reproduction.

The left-hand arm 30 of the frame is provided with a lug 31, arranged for the reception of a curved arm 32, having at one end a hook for the reception of the end of a carriage-returning spring 33, which moves the carriage back to starting position after the bar 17 has been elevated, and in order to properly sustain the weight carried during this operation this arm 30 carries a small locking-spring 34, the upper end of which is bent rearward, forming an arm 35, that is adapted to extend under the bar 17 and lock the same in the elevated position.

At a point near the arm 30 is a stud or bracket 37, to which is pivoted an arm 38, that is bent upward to the rear of the bar 17 and is provided with an opening for the reception of a pin 40, which may be locked in place by a set-screw 41, and this pin has a threaded inner end on which is mounted a nut 42 to be engaged by the arm B when the carriage reaches the initial or starting position. The arm 38 is bifurcated, so as to form an auxiliary arm 45, that extends rearward of the arm 30 of the frame and is provided with two stops 46 and 47, arranged, respectively, to engage against the outer and the inner faces of the arm 30 and limit movement of the arm 38. This auxiliary arm 45 is rounded and forms a cam for engagement with the lower face of the arm 16 of the carriage-supporting bar 17, and when said arm 38 is pulled to the right by an adjustable spring 49, extending between the arm and the standard 50, the cam will elevate the arm 16 and the bar 17, this operation occurring immediately after the carriage-arm B moves the arm 22 to release position.

At the right-hand end of the frame is a spring 51, one end of which is connected to the arm 18 and the other end to the arm 15 of bar 20, this spring 51 being much weaker than the spring 49 and serving to draw the bar 20 down to the lowest position after the arm 38 has been moved outward by engagement of the sound-reproducing carriage therewith, and in this connection it is to be noted that the downward movement of the bar 17 under the influence of the spring 51 is limited by a stop 54, that projects from the auxiliary cam-arm 45.

In the operation of the device the bar 17 will be normally held in its lowest position by the engagement of the lug 21 with the inclined face 20 of the bar. As the sound-box carriage moves to the right during the reproducing operation the arm B of the carriage will finally engage with the nut 29 of pin 27, moving the arm 22 to the right and releasing the lug 21. As soon as this occurs the heavy spring 49, acting on the arm 38, causes the auxiliary cam-arm 45 to act on

the arm 16 and elevate the bar 17 to such an extent as to raise the sound-box carriage to the inoperative position. As soon as this occurs the spring-lock 34 moves under the lower edge of the bar 17 and locks the latter in elevated position, so as to support the weight of the sound-box carriage during its return to initial position under the retractile force of the spring 33.

When the arm B of the sound-box carriage engages the nut 42 of pin 40, it will move the arm 38 to the left, and said arm will engage the arm 35 of spring 34, moving the latter to release position, and at the same time the cam-arm 45 will be carried to the left, moving gradually from under the arm 16 and permitting the spring 51 to draw the bar 17 down to the initial position. As soon as this is accomplished the stylus of the sound-box engages the record at the starting-point, and at the same time the arm 22 moves to the left and its lug 21 engages over the bar 17, holding the latter down until the completion of the reproducing operation, after which the same operation is repeated as many times as necessary or until the motive power is exhausted.

I claim—

1. In a reproducing apparatus for sound-reproducing machines, a rest or support for the sound-box, movable to disengage the latter from the prime mover, an elastically-mounted stop member at one end of the rest or support and in the path of the sound-box, said stop member being put under stress by the sound-box and normally locked by the rest or support, and another elastically-mounted stop member at the other end of the rest or support normally locking the latter in the depressed position and arranged in the path of the sound-box.

2. A repeating attachment for sound-reproducing machines comprising a rest or support for the sound-box, movable to disengage the same from the prime mover, a movable member in the path of the sound-box locking said rest or support in the depressed position, another movable member also in the path of the sound-box and impelled thereby to a position of stress, means carried by said last-named movable member for elevating the sound-box rest or support, and a lock for holding the rest or support in elevated position, said lock being under the control of said last-named movable member to operate said lock to release the rest or support.

3. In repeating apparatus for sound-reproducing machines, a pivotally-mounted bar adapted to support the sound-box carriage during its return to starting position, a locking-arm for holding said bar depressed, an adjustable member carried by the arm and disposed in the path of movement of the sound-box carriage, a spring-actuated cam for elevating said bar, means for locking said

bar in the elevated position, and means operable on the return of the carriage to starting position for releasing the bar and moving the cam to inoperative position.

5 4. In repeating apparatus for sound-reproducing machines, a pivotally-mounted bar arranged to form a support for the sound-box carriage during its return to starting position, a pair of pivotally-mounted arms, and
10 springs controlling the elevation and depression of the bar, adjustable pins carried by the arms and each having a threaded end, and a nut screwed on each pin and disposed in the path of movement of the sound-box carriage.

15 5. In repeating apparatus for sound-reproducing machines, a frame, means for adjustably securing the same to the machine, a horizontally-arranged pivotally-mounted bar carried by said frame, a pivotally-mounted
20 arm having a lug arranged to lock said bar in

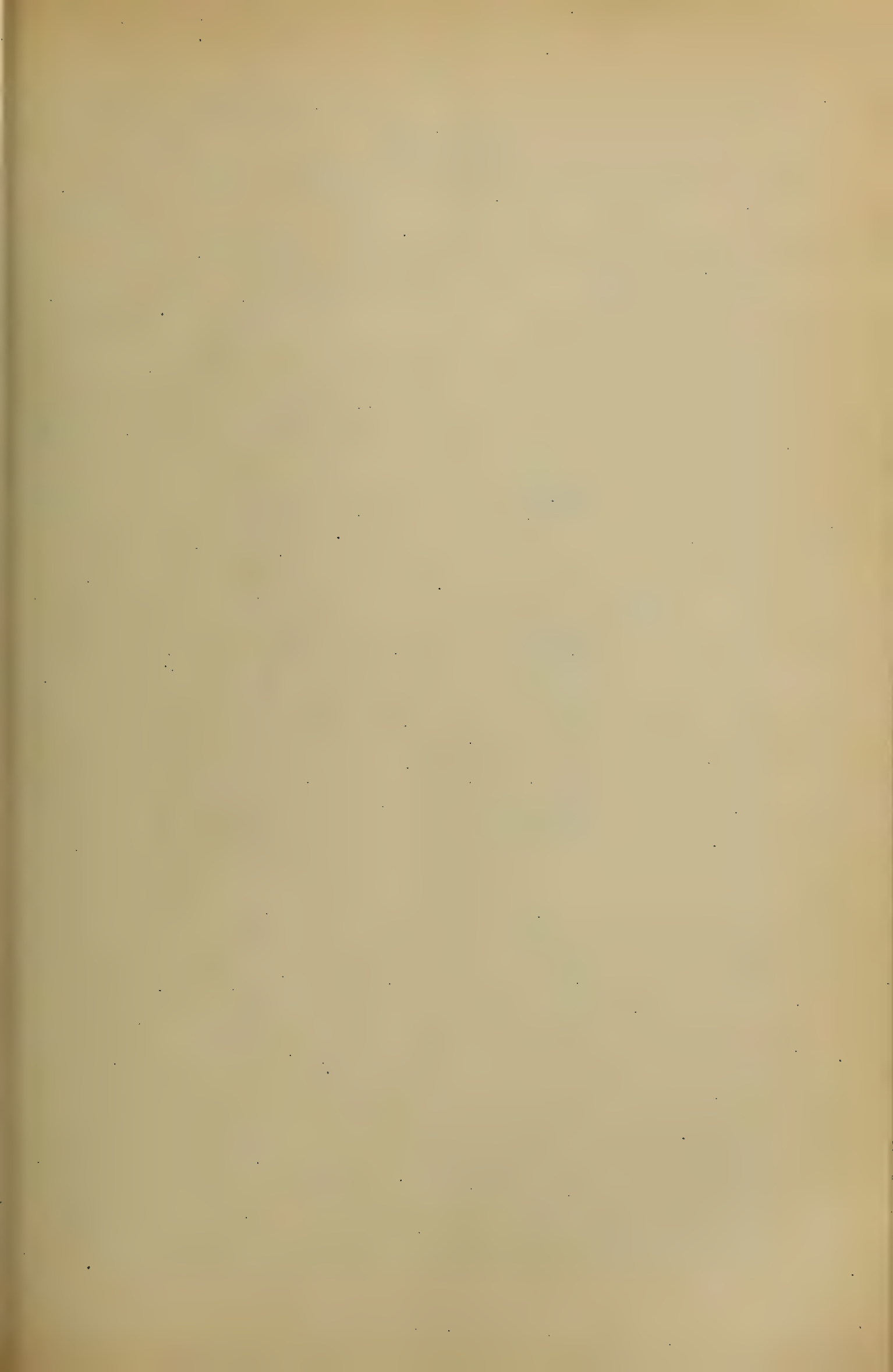
depressed position, said arm being disposed in the path of movement of the sound-box carriage, a spring tending to depress the bar, a second arm also disposed in the path of movement of the sound-box carriage, a lock- 25 ing-spring for holding the bar in elevated position, said spring being disposed in the path of movement of the second arm, a cam carried by said second arm and tending to elevate the bar, a spring for actuating the cam, 30 a second arm, and means for returning the sound-box carriage to initial position.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

LYMAN D. KELLEY.

Witnesses:

RUDOLPH J. ABEL,
J. P. KEIRAN.



E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 26, 1902.

Fig. 1.

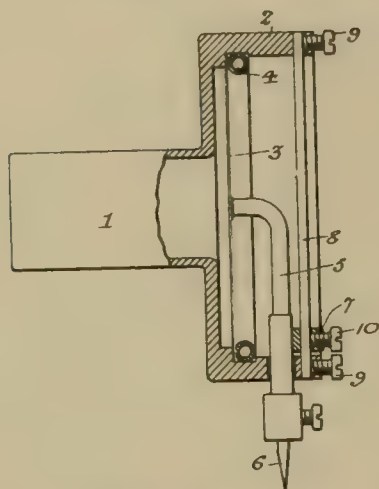


Fig. 2.

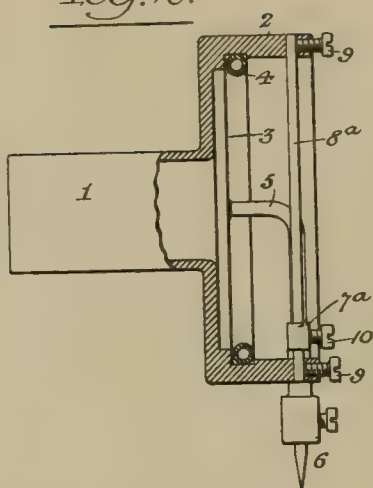
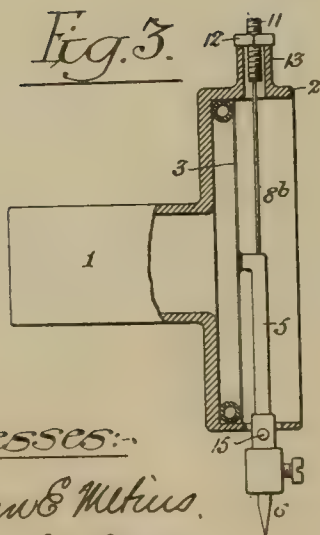


Fig. 3.



Witnesses:

Herman E. McKus.
Frank L. Graham.

Fig. 4.

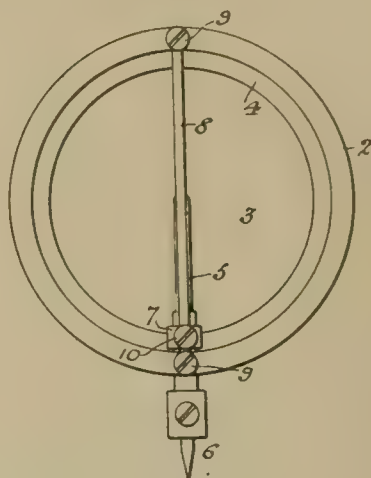


Fig. 5.

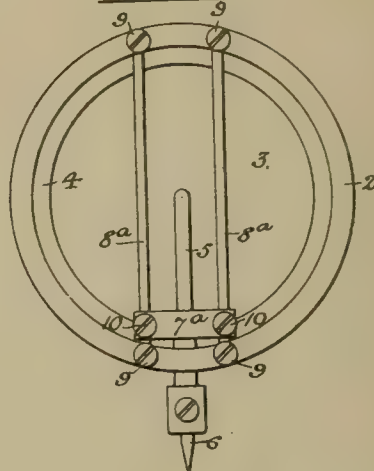
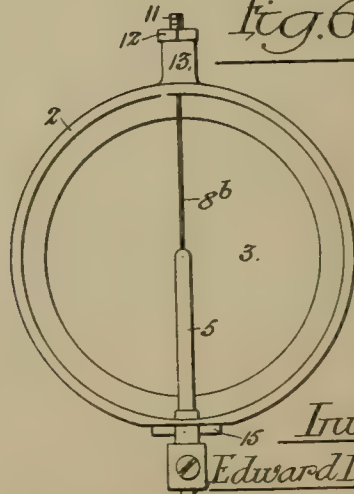


Fig. 6.



Inventor:

Edward D. Gleason.

By His Attorneys:

Howell & Howan

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, OF
CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 846,024.

Specification of Letters Patent.

Patented March 5, 1907.

Application filed July 26, 1902. Serial No. 117,134.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to provide the stylus-lever of a talking-machine sound-box with an elastic connection or mounting whereby a certain amount of tension will always be imparted to the diaphragm and better results in reproduction will be attained than when such elastic connection or mounting is not provided.

In the accompanying drawing, Figure 1 is a sectional view of a talking-machine sound-box constructed in accordance with my invention. Figs. 2 and 3 are similar views illustrating other embodiments of the invention; and Figs. 4, 5, and 6 are front views of the sound-boxes shown in Figs. 1, 2, and 3, respectively.

The sound-box has a tubular stem 1 with enlarged or cup-shaped end 2, containing the diaphragm 3, the latter being mounted in this portion of the sound-box in any available manner. In the present instance the diaphragm is seated upon an internal annular shoulder in the portion 2 of the sound-box casing and is retained in position thereon by an elastic ring 4, which engages an internally-grooved portion of the sound-box.

The stylus-lever 5 projects through an opening in one side of the enlarged portion 2 of the sound-box casing and is provided with a detachable stylus 6, as usual. Said stylus-lever has at its inner end a preferably integral portion which is bent so as to bear upon the diaphragm 3 and has formed upon or secured to it a projecting boss or lug 7, which is mounted upon an elastic rod or bar 8, crossing the sound-box casing outwardly beyond and in line with the stylus-lever, the opposite ends of this elastic rod or bar 8 being secured to the sound-box casing in any suitable manner—as, for instance, by soldering or brazing or by means of clamp-screws 9. The rod or bar 8 thus provides an elastic mounting for the stylus-lever and presses the inner end of the latter against the diaphragm with such force as to maintain said diaphragm normally un-

der a certain degree of tension, with the result that the reproduction of sound caused by the vibration of the diaphragm are clearer and more distinct than usual, there being an absence of collateral vibration such as would interfere with the distinct rendering of sounds resulting from the proper vibrations of the diaphragm caused by the action of the wales of the undulating groove of the record upon the stylus.

It is preferable in some cases to mount the lug 7 of the stylus-lever adjustably upon the elastic rod or bar 8, so that the inner end of the stylus-lever may be caused to bear upon different portions of the diaphragm, the lug being secured to the spring in its different positions of adjustment by means of a clamp-screw 10.

In that form of sound-box shown in Figs. 2 and 5 two elastic bars 8^a take the place of the single bar 8 of Fig. 1, the lug 7^a of the stylus-lever being widened, so as to engage with both of these bars, but the construction being otherwise similar to that of Fig. 1. In carrying out my invention, however, it is not necessary in all cases to mount the stylus-lever directly upon an elastic rod or bar, as I find that good results can be attained by connecting a spring to the inner end of the stylus-lever and to that portion of the diaphragm-casing opposite the portion through which the stylus-lever projects, an instance of this construction being shown in Figs. 3 and 6, where 8^b represents such a spring connected at one end to the inner end of the stylus-lever and at the other end to a threaded rod 11, which is engaged by a nut 12, the latter bearing upon the outer end of a tubular stud or boss 13 on the diaphragm-casing, so as to provide for imparting any desired degree of tension to the spring 8^b. When this form of spring connection is adopted, the method of mounting the stylus-lever upon the diaphragm-casing may be varied without departing from my invention, the lever in the present instance being provided with projecting trunnions 15, which bear upon the diaphragm-casing on opposite sides of the opening through which the stylus-lever passes, said trunnions thus forming a fulcrum upon which the stylus-lever can vibrate under the action of the wales of the waved or

undulatory groove of the record upon the stylus 6.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A talking-machine sound-box having a diaphragm and a casing therefor, a stylus-lever having an integral portion bent at an angle to the remainder and bearing directly upon said diaphragm, with a resilient bar extending substantially parallel to the diaphragm and forming an elastic connection between said stylus-lever and the side of the diaphragm-casing opposite that beyond which the said lever projects, said connection extending from its point of attachment to the stylus-lever in a direction opposite thereto and imparting resiliency to said lever, substantially as described.

2. A talking-machine sound-box having a diaphragm and a casing therefor, a stylus-lever bearing upon the diaphragm, a resilient bar extending substantially parallel to the diaphragm and crossing the diaphragm-casing in the same direction as said stylus-lever,

said bar providing a mounting for the lever, substantially as described.

3. A talking-machine sound-box having a diaphragm, a casing therefor, one or more elastic bars extending across said casing beyond the diaphragm, and a stylus-lever adjustably mounted upon said bar or bars, substantially as specified.

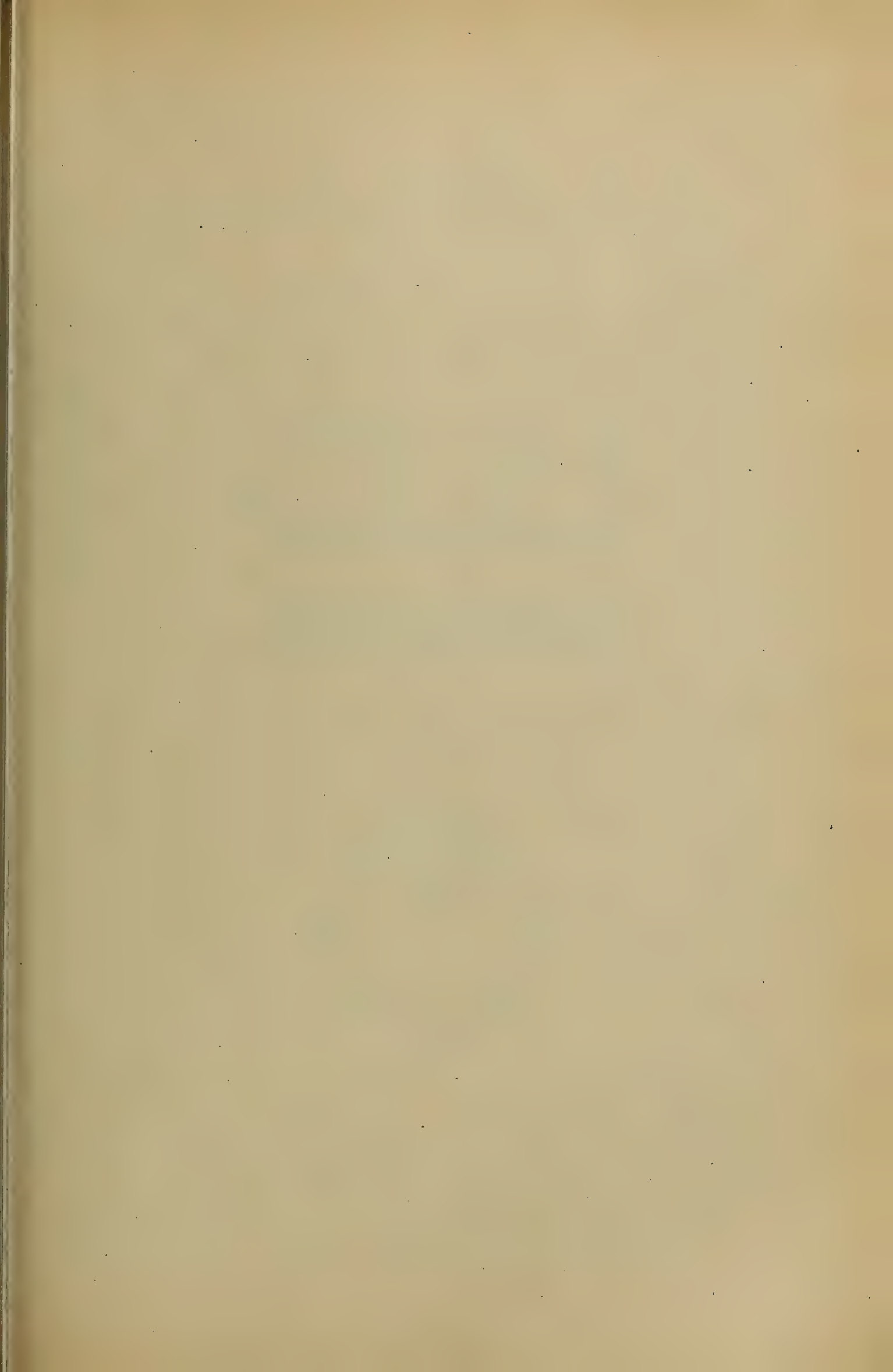
4. A sound-box provided with a diaphragm and with a stylus-lever projecting from one side thereof, a tensioning device for said stylus-lever parallel with said diaphragm and extending from said stylus-lever to the side of the casing opposite that from which the lever extends, the tension of said device being exerted to prevent lateral movement of said lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD D. GLEASON.

Witnesses:

F. E. BECHTOLD,
JOS. H. KLEIN.



No. 846,411.

PATENTED MAR. 5, 1907.

V. M. HARRIS.

APPARATUS FOR DUPLICATING PHONOGRAPH RECORDS.

APPLICATION FILED APR. 20, 1906.

Fig. 1.

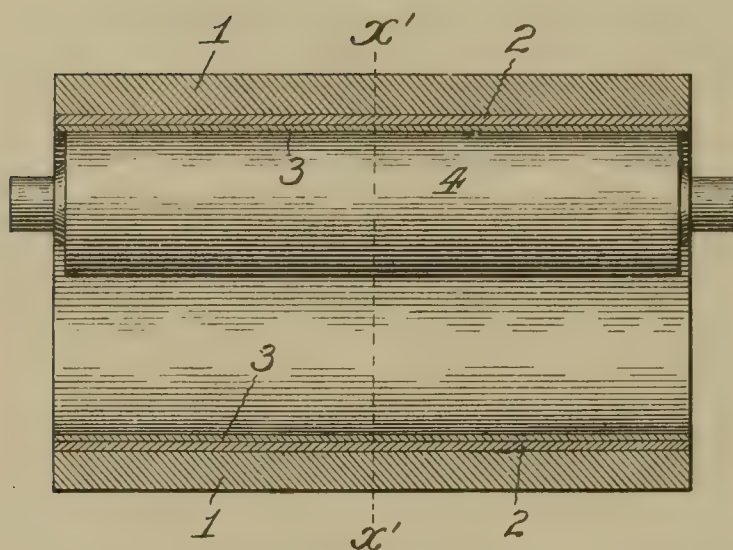
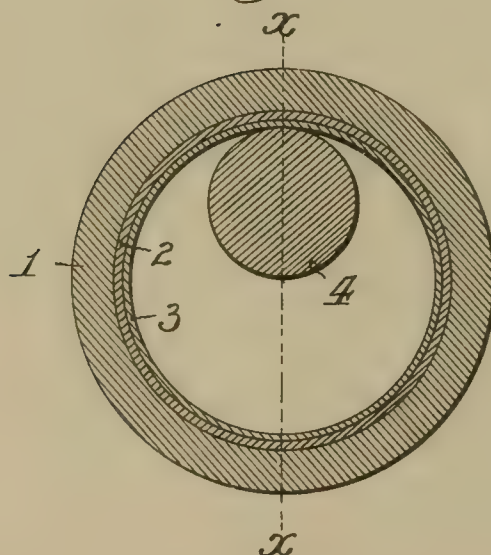


Fig. 2.



Attest:

John Enders.

M. A. Holmes

Inventor:

Varian M. Harris.

by Robert Burns Attorney

UNITED STATES PATENT OFFICE.

VARIAN M. HARRIS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH TO
ROBERT BURNS, OF CHICAGO, ILLINOIS.

APPARATUS FOR DUPLICATING PHONOGRAPH-RECORDS.

No. 846,411.

Specification of Letters Patent.

Patented March 5, 1907.

Original application filed April 11, 1904, Serial No. 202,515. Divided and this application filed April 20, 1906. Serial No. 312,763.

To all whom it may concern:

Be it known that I, VARIAN M. HARRIS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook
5 and State of Illinois, have invented certain new and useful Improvements in Apparatus for Duplicating Phonograph - Records, of which the following is a specification.

The present invention relates to the manu-
10 facture of duplicate phonograph-records of celluloid or other like material, in which a mold is used having a negative matrix formed in its interior surface or bore, and into which negative-matrix surface the du-
15 plicate phonograph-record in the form of a thin-walled cylinder is pressed to impart to the periphery of such cylinder a positive impression from such negative-matrix surface; and the object of the present improvement
20 is to provide a simple and efficient apparatus for use in the described process and with which the production of the duplicate records can be effected in a rapid, certain, and positive manner, all as will hereinafter more
25 fully appear and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present invention, Figure 1 is a longitudinal section of a primitive form of
30 apparatus embodying the present invention, the section being taken on line $x x$, Fig. 2; Fig. 2, a transverse section of the same at line $x' x'$, Fig. 1.

Similar numerals of reference indicate like
35 parts in both views of the drawings.

Referring to the drawings, 1 represents the main mold body or backing of any usual suitable external form and of the required length and which is formed with a longitudinal central bore, as shown; 2 a negative matrix, of
40 metal or other like hard substance, having a cylindrical form and fitted or fixedly secured within the bore of the main mold body or backing 1 as a lining. Such negative ma-
45 trix will have its interior surface formed into a negative matrix in any usual manner, either by electrolytic or other methods now generally employed in the present art.

3 represents the thin cylindrical duplicate-
50 record blank in place within the mold and in readiness to be formed into a completed record by the present apparatus.

4 is a pressure-roller of a cylindrical form having a uniform diameter along its entire

length and which is arranged longitudinally 55 within the bore of the mold and blank with its axis of rotation eccentric to the axis of the cylindric bore of the mold, &c., and with its periphery adapted to have forcible and rolling contact with the inner surface of the
60 blank along the entire length thereof, so that in its movement of rotation upon its own axis and in its orbital movement around the axis of the other parts the said pressure-roller will embed the periphery of the dupli- 65 cate-record blank 3 in the negative-matrix surface of the negative matrix 2, so that with a completion of the movement of said pressure-roller and the removal of such blank from the interior of the mold the pe- 70 riphery of such blank will have a positive impression of the negative matrix and be in a condition ready for use on a phonograph or like apparatus. Motion when required may be imparted to the said pressure-roller in a 75 positive manner by any suitable carrying and driving mechanism which the judgment of the maker may suggest or the particular use of the present invention may indicate.

In the practical use of the present appa- 80 ratus any usual and suitable means, either physical or chemical, may be employed to soften the duplicate phonograph-blank 3 during the process of imparting a positive impression upon the same from the negative- 85 matrix surface 2 and with a view to expedite the operation of the apparatus or when required in the formation of a more perfect positive impression upon the pe- riphery of such duplicate-record blanks. 90

The present apparatus is more especially adapted to the formation of duplicate records having very thin walls, which render them readily collapsible, in that by partly collapsing the same they can after forming 95 be readily and quickly removed from the interior of the mold without any liability to a marring or defacement of the positive-record impressions upon their peripheries.

The process or method herein described 100 constitutes the subject-matter of my application for Letters Patent, filed April 11, 1904, Serial No. 202,515.

Having thus fully described my said invention, what I claim as new, and desire to se- 105 cure by Letters Patent, is—

1. In an apparatus for making duplicate phonograph-records the combination of a

phonograph-mold having a longitudinal circular bore that is provided with a negative-matrix surface, and a pressure-roller of a cylindrical form having a uniform diameter
5 along its entire length and arranged to move in an orbital path with relation to such matrix-surface and impart a positive impression to an interposed cylindrical phonograph-blank of flexible material, along the entire length of such blank and in a progressive
10 manner, substantially as set forth.

2. In an apparatus for making duplicate phonograph-records the combination of a phonograph-mold having a longitudinal circular bore that is provided with a negative-matrix surface and a pressure-roller of a cylindrical form having a uniform diameter
15

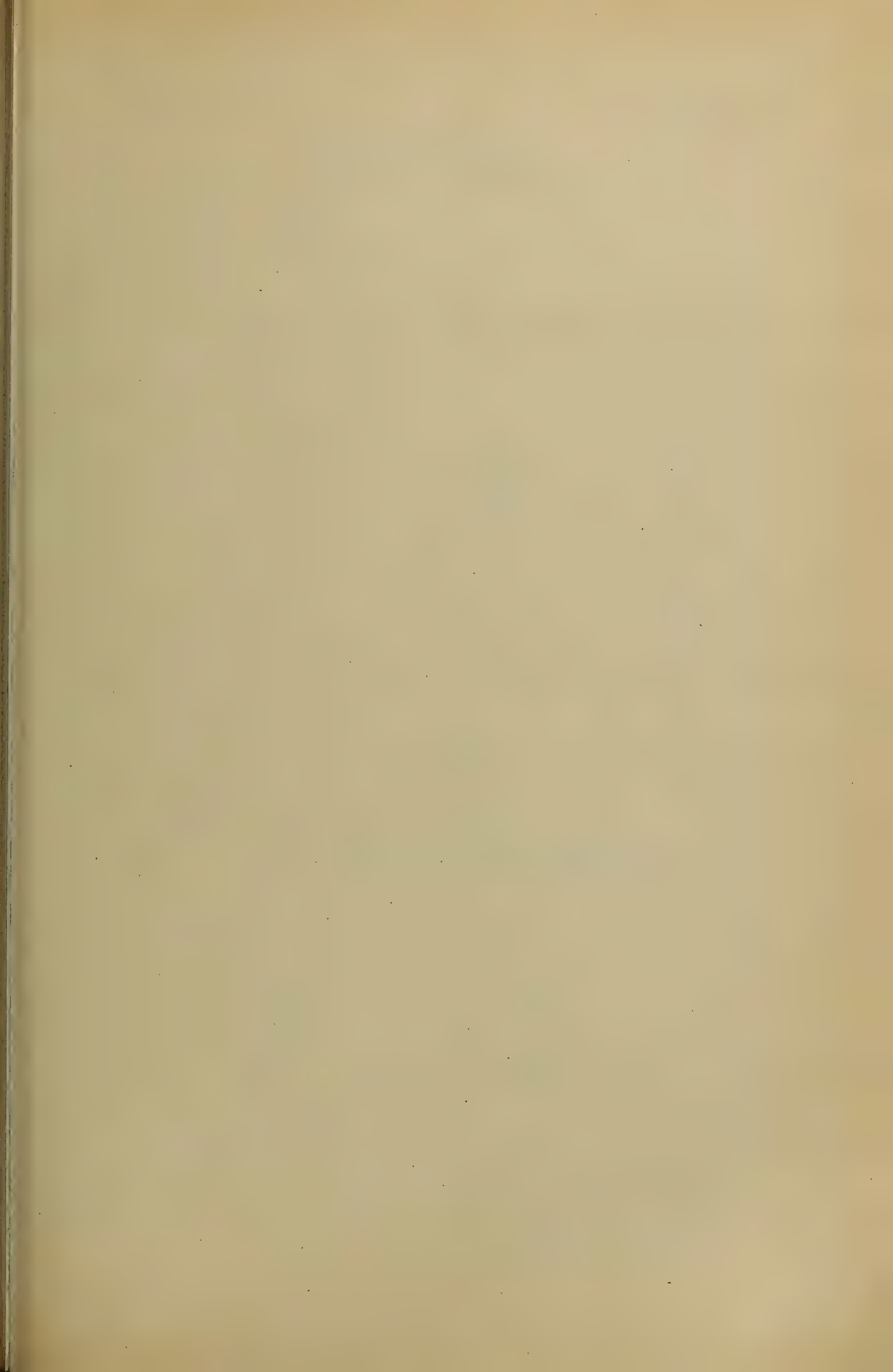
along its entire length and arranged longitudinally in said bore with its axis eccentric to the axis of such bore, and adapted to have
20 a rotary movement around its axis and an orbital movement around the axis of said bore, so as to impart a positive impression to an interposed cylindrical phonograph-blank of flexible material, along the entire length of
25 such blank and in a progressive manner, substantially as set forth.

Signed at Chicago, Illinois, this 14th day of April, 1906.

VARIAN M. HARRIS.

Witnesses:

ROBERT BURNS,
M. H. HOLMES.



E. WAWRINA.
GRAMOPHONE MECHANISM.
APPLICATION FILED NOV. 7, 1906.

3 SHEETS—SHEET 1.

Fig. 1

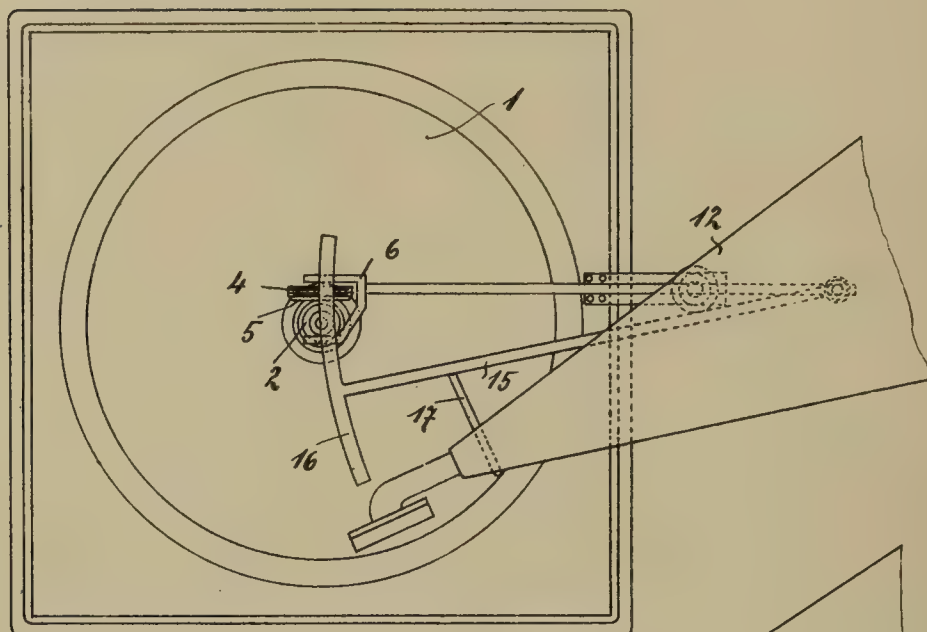


Fig. 2

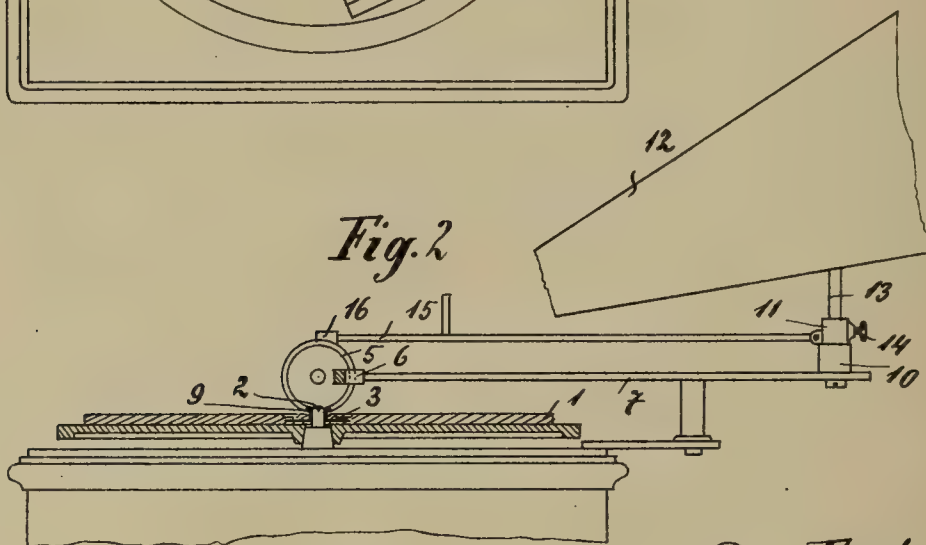


Fig. 3

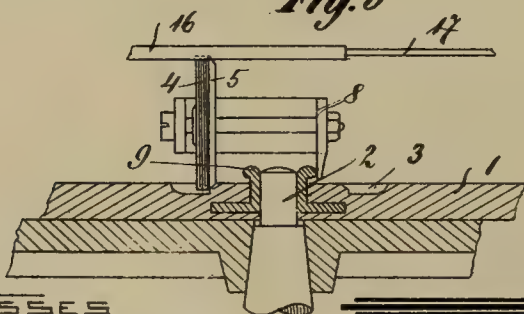
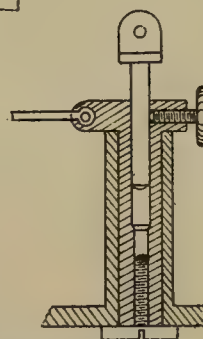


Fig. 4

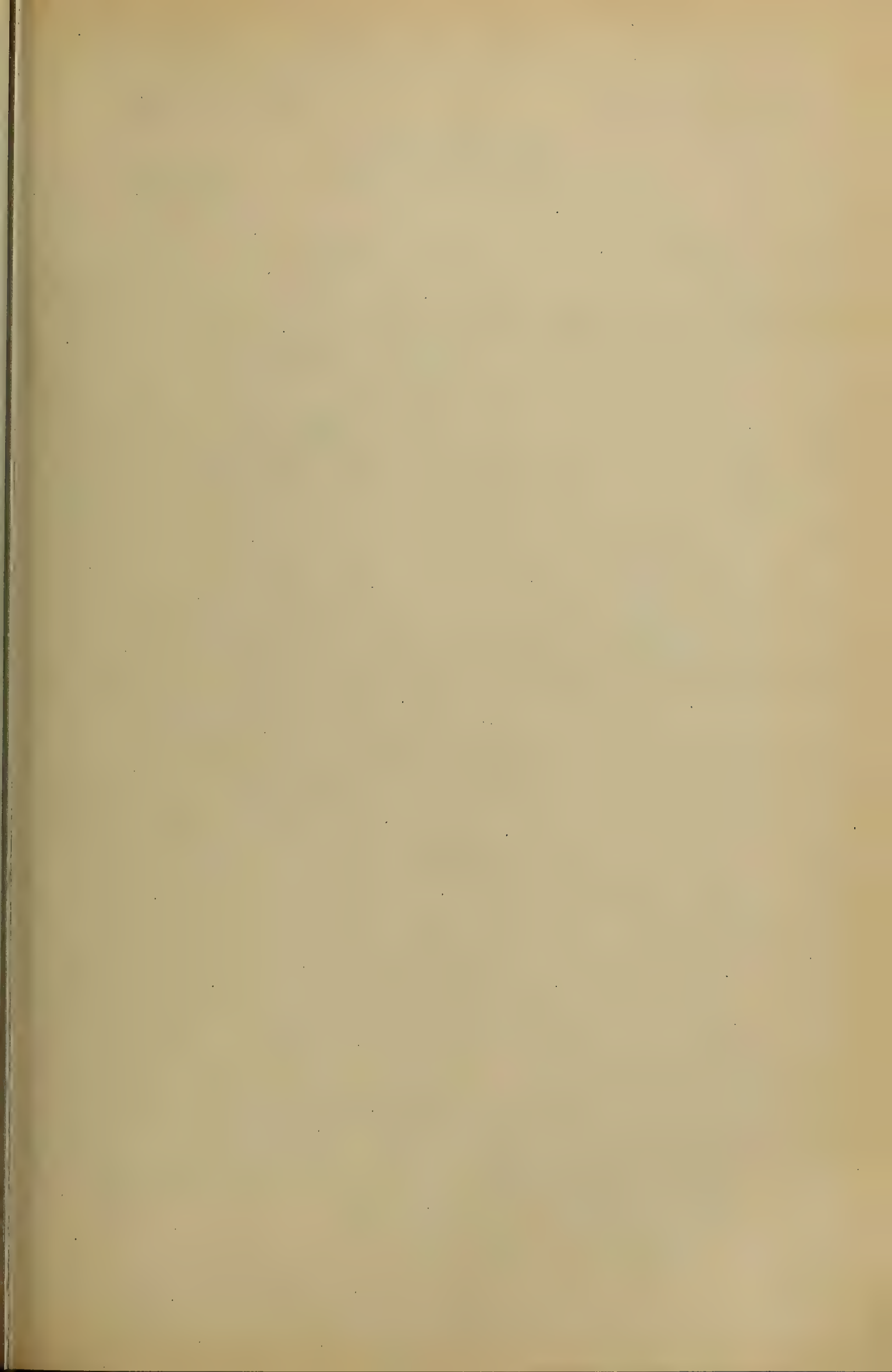


WITNESSES

Wm. Drell.
Adela Blatt.

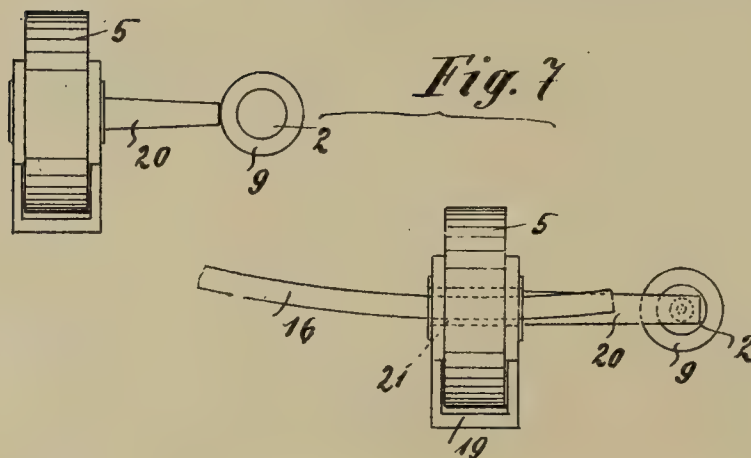
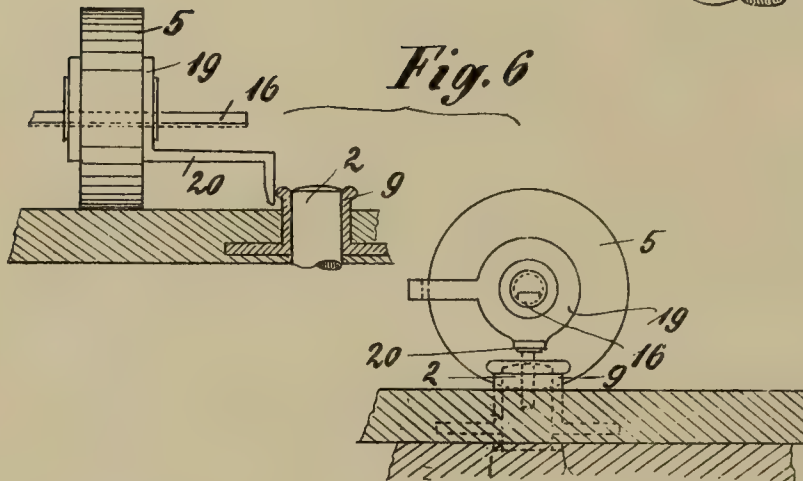
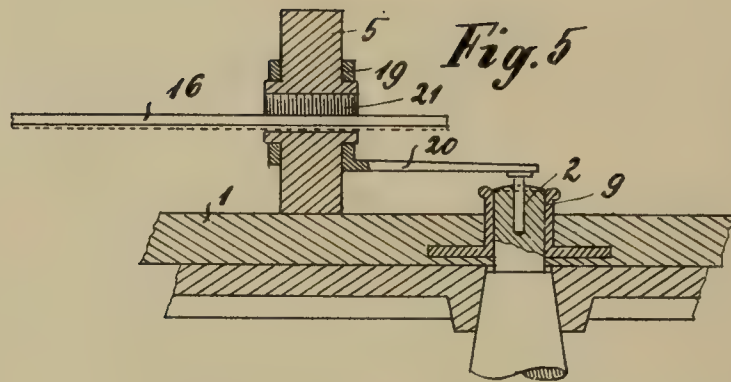
INVENTOR.

Eduard Wawrina
by
Easton Steward
Att'y.



E. WAWRINA.
GRAMOPHONE MECHANISM.
APPLICATION FILED NOV. 7, 1905.

3 SHEETS—SHEET 2



WITNESSES.

Wm. Drell.
Adel. Blatt.

INVENTOR.

Eduard Wawrina
by
Eastman Howard Mayo

E. WAWRINA.
GRAMOPHONE MECHANISM.
APPLICATION FILED NOV. 7, 1905.

3 SHEETS—SHEET 3.

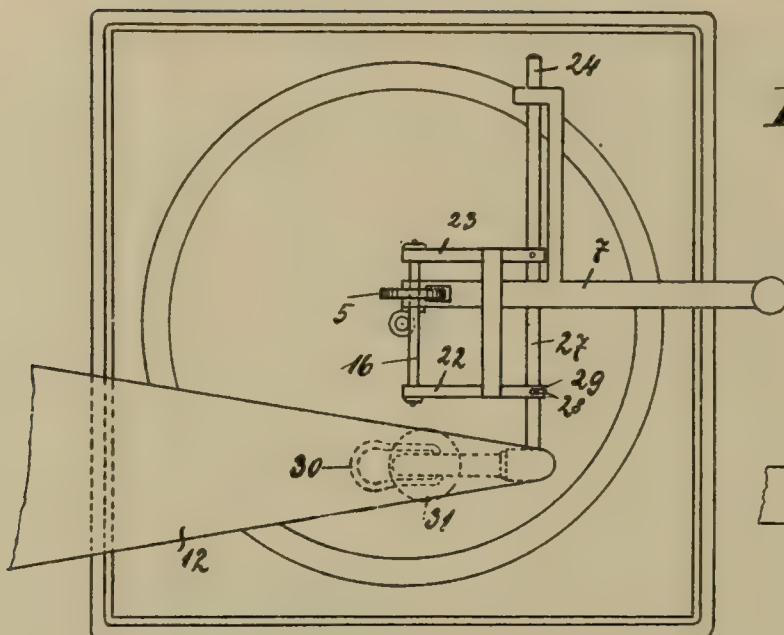


Fig. 8

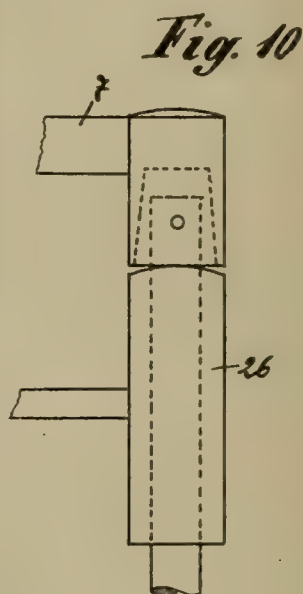


Fig. 10

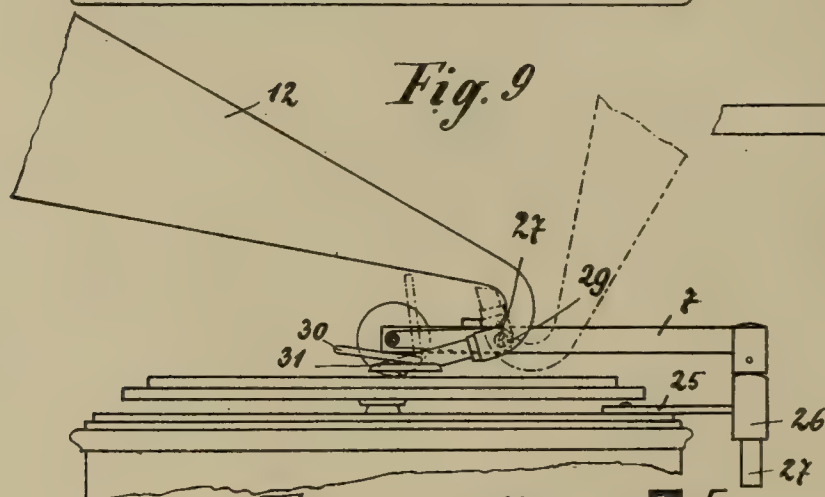


Fig. 9

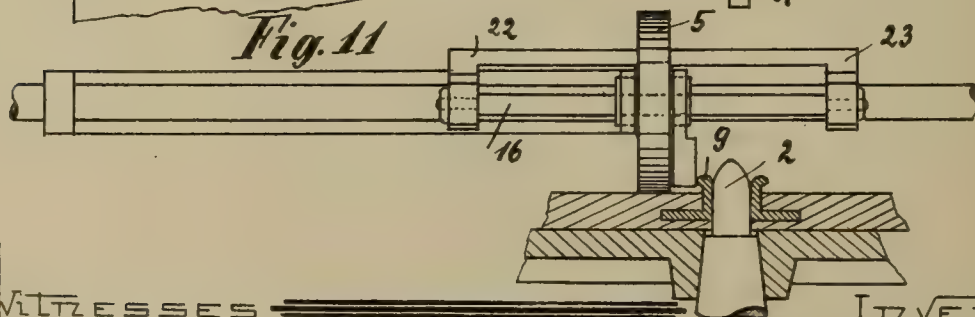


Fig. 11

WITNESSES
Wm. Small.
Adele Glatt.

INVENTOR.
Eduard Wawrina
by Sartorius & Co.

UNITED STATES PATENT OFFICE.

EDUARD WAWRINA, OF VIENNA, AUSTRIA-HUNGARY.

GRAMOPHONE MECHANISM.

No. 847,033.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed November 7, 1905. Serial No. 286,306.

To all whom it may concern:

Be it known that I, EDUARD WAWRINA, mechanician, a subject of the Emperor of Austria, residing in Vienna VI., Gumpendorferstrasse 32, Austria-Hungary, have invented new and useful Improvements in or Relating to Gramophone Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of the present invention consists of a receiver mechanism for gramophones in which a displacing mechanism directly operated by the motion of the plate and comprising a rotary part engaging the plate causes the receiving-trumpet, connected in the usual manner with the reverberator and the stylus, to possess a motion toward the middle of the plate, and thus force the stylus to engrave spiral courses on the plate.

In the drawing the object of the invention is illustrated in three constructional forms by way of example.

Figures 1 and 2 illustrate one constructional form in plan view and in side elevation and partial section, whereas Figs. 3 and 4 illustrate details of the apparatus. Figs. 5 to 7 show a second constructional form of the invention in longitudinal section, side elevation, and plan, respectively, while Figs. 8 and 9 illustrate the third constructional modification, and Figs. 10 and 11 illustrate further details of the apparatus.

The plate or record-tablet 1, operated in the well-known manner by means of clock-work or the like, possesses a groove arranged concentrically to the opening for the reception of the central pivot 2. By means of this groove a hub is formed, the outer edge of whereof is sloped off, so that it forms a cone or friction wheel 3. With this projection a cone or friction wheel 5, bearing a worm-wheel 4, engages, said cone-wheel being preferably supported in the fork end 6 of a revolvable arm 7, connected with the gramophone-box.

In order to maintain the two above-mentioned wheels continuously in engagement with each other, there is provided a pivot 8, fixed to the end of the arm 6, forming the bearing, which pivot slides on the periphery of the plate-aperture 9, and thereby assures

the connection of the cone-wheels, which can, moreover, be adjusted relatively to each other by adjustment of the screw 18.

At the free end of the supporting-arm 7 is provided a cylinder 10, which again supports a second cylinder 11, in which a pivot 13, supporting the trumpet, is capable of being secured at the desired height by means of a set-screw. To the inner cylinder 11 aforesaid there is attached an arm 15, which supports a toothed rack at its end, which rack engages with the aforesaid worm-wheel 4.

The operation of the device for the forming of records is as follows: By means of the set-screw 14 the trumpet 12 is so adjusted that the stylus placed upon the outer edge of the plate 1 presses upon it with the required pressure. The plate 1 is then rotated in the well-known manner, whereby the cone-wheel 3 5 aforesaid also receives rotary motion, and by means of the worm-wheel 4 and curved rack 16 the arm 15 and also (by the turning of the trumpet 12) the stylus are drawn gradually toward the middle of the plate. From these two motions there results a spiral drawn by the stylus. By suitably adjusting the gearing the mutual distance between the separate spirals can be regulated at will.

In a constructional modification, Figs. 5-7, a plate is provided which has at its center either a projecting journal-box or a hub. Instead of the cone-wheels above described there is in this modification provided a friction-wheel adapted to revolve either against the plate or in a groove on the plate, which friction-wheel is maintained constantly at the same distance from the pivot 2 of revolution by means of a bow 20, connected with the main bearing or simply supported on the central pivot 2. The friction-wheel 5 aforesaid is provided in the inside of the hub with a threading 21, by means of which when the said wheel 5 is revolved a tooth-rack 16 is operated, and thereby the trumpet is moved with it toward the middle of the plate. The operation of this modification is identical with that of the one first described, and the bow 20 may also be connected in any other convenient manner with the revolving pivot 2 or the central aperture 9.

In another modification, Figs. 8-12, the driving of the apparatus is effected as already set forth; but there is a spindle 16 or toothed rack which can be placed between two arms 22 and 23, which arms may form, if desired, a fixed frame. These are con-

needed with an axle 24, which is itself adjustably supported upon another arm 7, provided with a side arm. On this axle the trumpet is supported, or it may rest upon the rigid arms 22 23 aforesaid. In order to render the interchange of the membrane easier and to effect the engagement and disengagement of the apparatus more easily, the axle supporting the trumpet and the bent tube is arranged revolubly. The limitation of the motion hereof is provided for by having in the frame a slot 28 and a pin 29, which pin 29 is attached to the supporting-axle 27. Moreover, it appears often desirable to prevent the pressure of the membrane 31, for which purpose there is arranged a revoluble bow 30, by aid of which the center of gravity can be altered at will, and thus the pressure can also be regulated as desired. Any other loading of the membrane 30 is thus rendered unnecessary.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a gramophone and its rotary record-tablet, a movable stylus-supporting member, means for supporting said member, and means, operative from said tablet and comprising a rotary part engaged with the tablet, for moving the stylus relatively to the tablet, substantially as described.

2. The combination of a gramophone and its rotary record-tablet having a concentric hub, a movable stylus-supporting member, means for supporting the said member and means, operative from said hub and comprising a rotary part engaged with the tablet,

for moving said member on its pivot whereby to effect a movement of the stylus relatively to the tablet, substantially as described.

3. The combination of a gramophone and its rotary record-tablet, a pivoted stylus-supporting member and means comprising a rotary toothed part engageable with the tablet and a rack controlling said stylus-supporting member, for moving said member on its pivot and thus moving the stylus relatively to the tablet, substantially as described.

4. The combination of a gramophone and its rotary record-tablet, an arm, means for supporting said arm, a rotary toothed part engageable with the tablet and journaled in said arm, a stylus-supporting member fulcrumed in said arm and a rack carried by said member and engaging said toothed part, substantially as described.

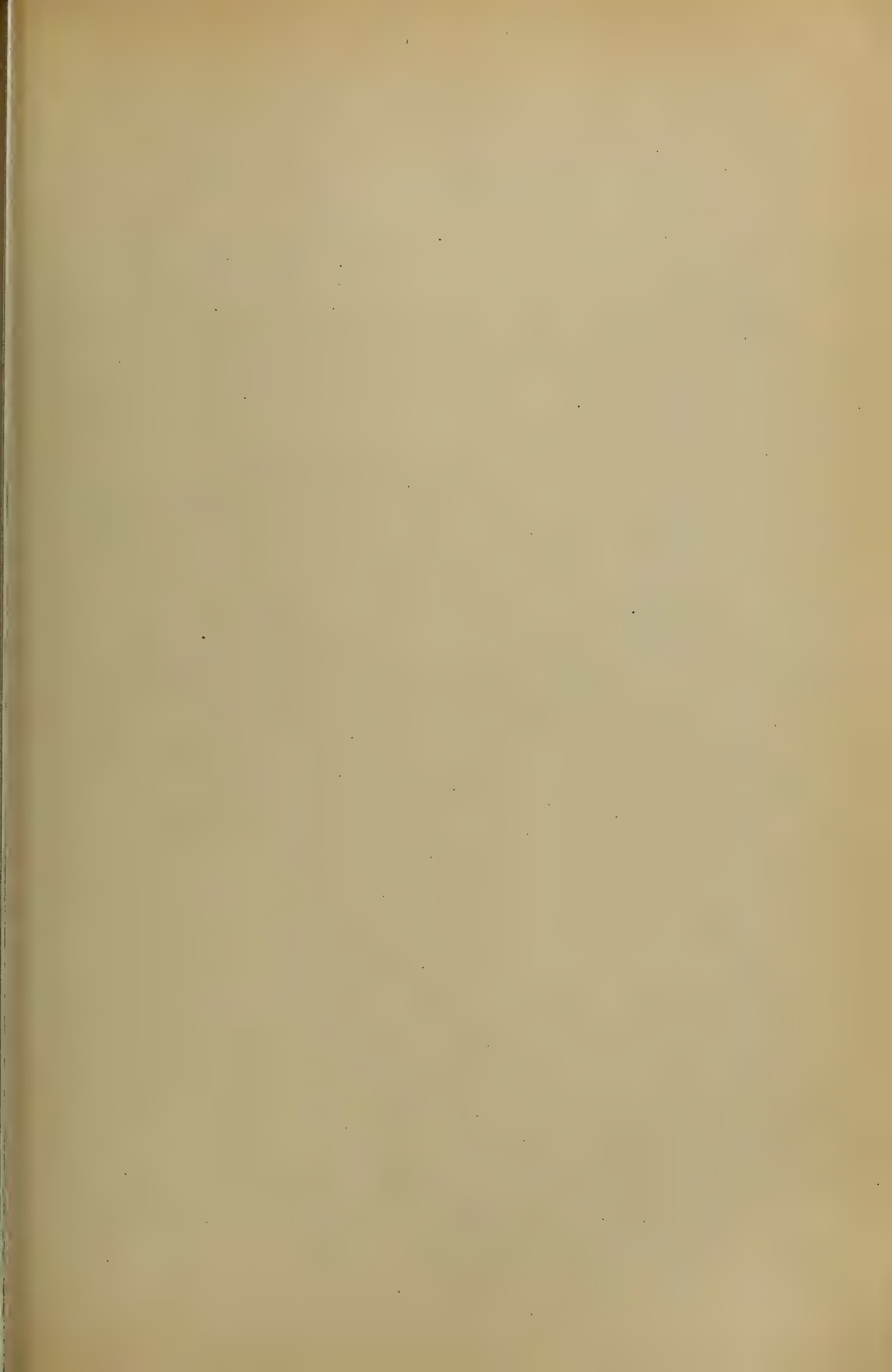
5. The combination of a gramophone and its rotary record-tablet, an arm, means for supporting said arm, said tablet having a concentric hub, a rotary toothed part engaging the hub and journaled in said arm, means for maintaining said part in engagement with the hub, a stylus-supporting member fulcrumed in said arm and a rack carried by said member and engaging said toothed part, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 21st day of October, 1905.

EDUARD WAWRINA.

Witnesses:

OMION ST. A. DURR,
ALVESTO S. HOGUE.



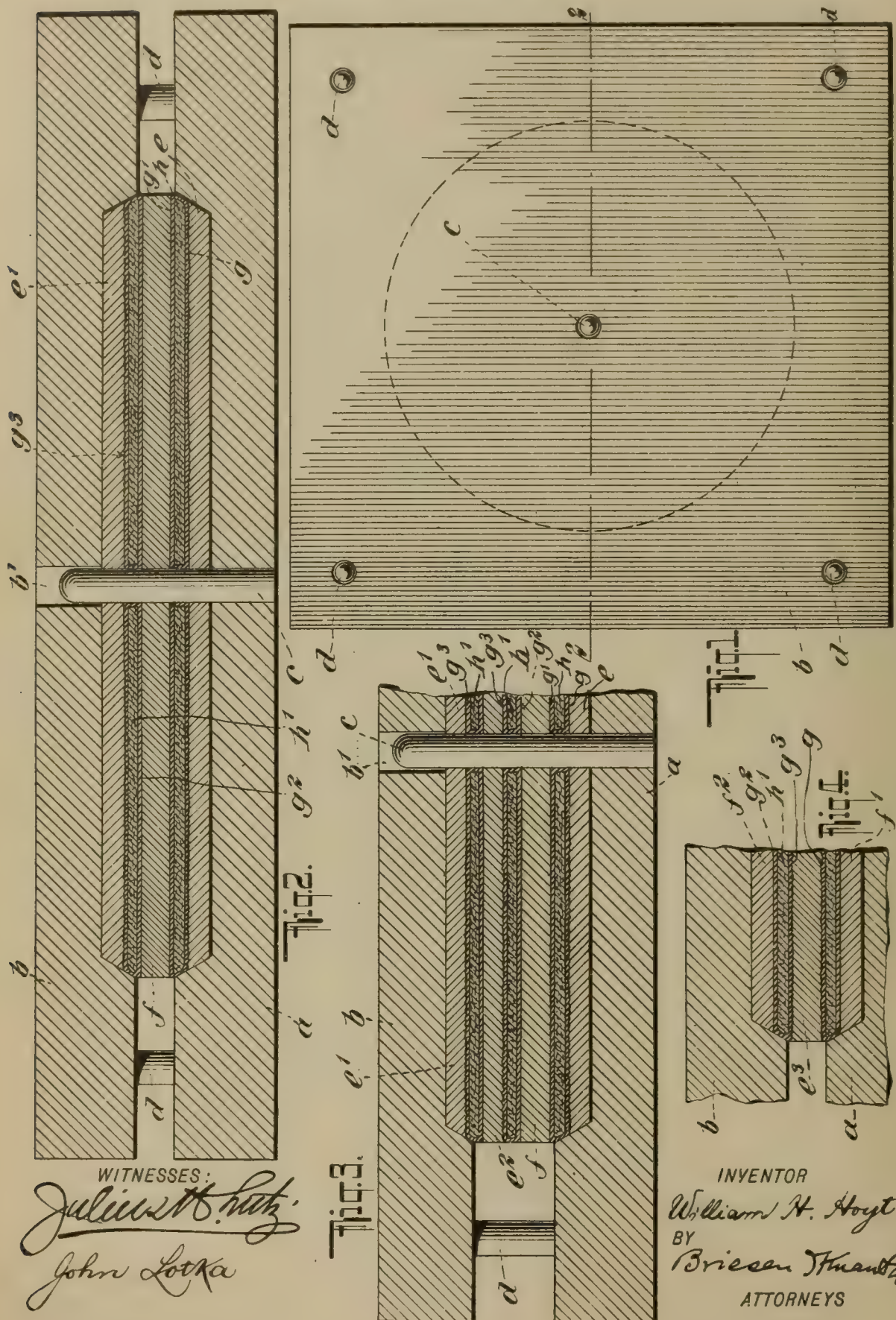
No. 847,338.

PATENTED MAR. 19, 1907.

W. H. HOYT.

APPARATUS FOR MAKING FLAT TALKING MACHINE RECORDS.

APPLICATION FILED FEB. 6, 1906.



UNITED STATES PATENT OFFICE.

WILLIAM HELM HOYT, OF WYOMING, NEW JERSEY.

APPARATUS FOR MAKING FLAT TALKING-MACHINE RECORDS.

No. 847,338.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed February 6, 1906, Serial No. 299,698.

To all whom it may concern:

Be it known that I, WILLIAM HELM HOYT, a citizen of the United States, and a resident of Wyoming, in the county of Essex and State of New Jersey, have made and invented certain new and useful Improvements in Apparatus for Making Flat Talking-Machine Records, of which the following is a specification.

My invention relates to the manufacture of flat records or disk records for talking-machines, and has for its object to provide means for making a plurality of such records at one operation.

The invention will be fully described hereinafter and the features of novelty pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a plan view of an apparatus suitable for the purposes of my invention. Fig. 2 is a sectional elevation thereof on line 2 2 of Fig. 1. Figs. 3 and 4 are partial sectional elevations showing two other ways of carrying out my invention.

As illustrated in Figs. 1 and 2, the apparatus or mold comprises a bottom plate *a* and a top plate *b*, which are adapted to be pressed toward each other by any suitable mechanism, such as a hydraulic press. Suitable means are provided for guiding the plates in their relative movement and for properly centering the record. Such means may consist of a center pin *c*, secured to the bottom plate *a* and projecting into an opening *b'* of the top plate *b*, and of dowels or guide-pins *d* likewise secured to the bottom plate *a* and sliding through suitable openings of the top plate *b*, said guide-pins being located adjacent to the four corners. The opposing faces of the top plate and bottom plate are recessed, as shown, to receive matrices *e* and *e'*, respectively, the molding-surfaces of which face each other. These matrices may be alike, so as to produce the same record, or they may belong to different records. The apparatus shown in Figs. 1 and 2 further comprises a central plate or backing *f*, preferably made of metal.

In operation after the matrix *e* has been placed in the recess of the bottom plate *a* a disk *g* of celluloid, fiberloid, pyroxylin, hard rubber, or any other hard gramophone material, (preferably, however, celluloid,) is placed on the upwardly-facing molding-surface of the matrix. Then the foundation *h*

is placed on the celluloid disk *g*, said foundation consisting of cardboard or any fibrous or other suitable material which need not be plastic. Then follows another disk *g'* of celluloid or other gramophone material. Then the metal plate or backing *f* is placed over the centering-pin *c* and a celluloid disk *g''* and cardboard foundation *h'* and a celluloid disk *g'''* are placed on top in substantially the same manner as described for the lower record. Then comes the second or upper matrix *e'* with its molding-face downward, and finally the top plate *b*. It will of course be understood that all the parts which are slid on the centering-pin *c* are provided with proper openings for this purpose. The mold having thus been assembled together with the parts of the record is placed in a hydraulic press and there subjected to the requisite amount of pressure. At the same time heat is applied—as, for instance, by means of steam—so as to soften the celluloid or other plastic material, which thus takes the impression from the molding-surfaces of the matrices. At the same time the marginal portion of the celluloid layers or disks will generally melt or be softened sufficiently to form a connection around the edge of the foundations *h* or *h'*, as shown in Fig. 1, so that the foundation will be entirely enveloped by the celluloid or other plastic substance. After the pressure and heat have been continued a sufficient length of time the press and mold are cooled in any suitable way, as by means of cold water. Then the pressure is released and the finished records are removed from the mold.

While I have described the making of only two records at a time, I desire it to be understood that my invention is applicable to the making of a much larger number of records by one operation. Thus in Fig. 3 I have shown the simultaneous making of three records. The apparatus differs from that shown in Fig. 2 only by the use of an additional matrix *e''* between the top matrix *e'* and the backing-plate *f*. This matrix *e''* is substantially the same as the top matrix *e'*, but has its periphery perpendicular instead of slanting. It will be seen without further detailed description how three records are produced by one operation in this instance.

In some cases a matrix may have molding-surfaces on both sides, as shown in Fig. 4, for the matrix *e'''*. The recesses of the bottom plate *a* and top plate *b* in this case re-

ceive backing-plates f' f'' , respectively, instead of the matrices e e' . The operation is substantially the same as hereinbefore described.

5 I have ascertained that up to ten records may be made readily at one operation by the use of my invention.

If desired, a double record having a record-groove on each surface may be produced by
10 placing the record-blank between two matrices the molding-surfaces of which are toward each other.

The process herein described is claimed in a divisional application filed by me August
15 15, 1906, Serial No. 330,648.

I claim as my invention—

1. An apparatus for making flat talking-machine records, comprising two plates movable toward and from each other, a central
20 guiding-pin on one of the plates, and an intermediate plate fitted on said pin, and forming spaces at each side of said intermediate plate for the reception of record material, one of the surfaces which bound each of such
25 spaces having sound-record grooves, while the other surface bounding the same space acts as a backing.

2. An apparatus for making flat sound-records, comprising opposing end plates movable relatively to each other, an intermediate
30 plate located between said end plates and

adapted to be spaced therefrom to accommodate the record material, one of the faces which engage the record material being a molding-surface while the other surface which
35 engages the same record material acts as a backing.

3. An apparatus for making flat sound-records, comprising two end plates movable relatively to each other, matrices engaging
40 said end plates and having molding-grooves on their opposing surfaces, and an intermediate plate located between said matrices and adapted to form a backing for the record material.

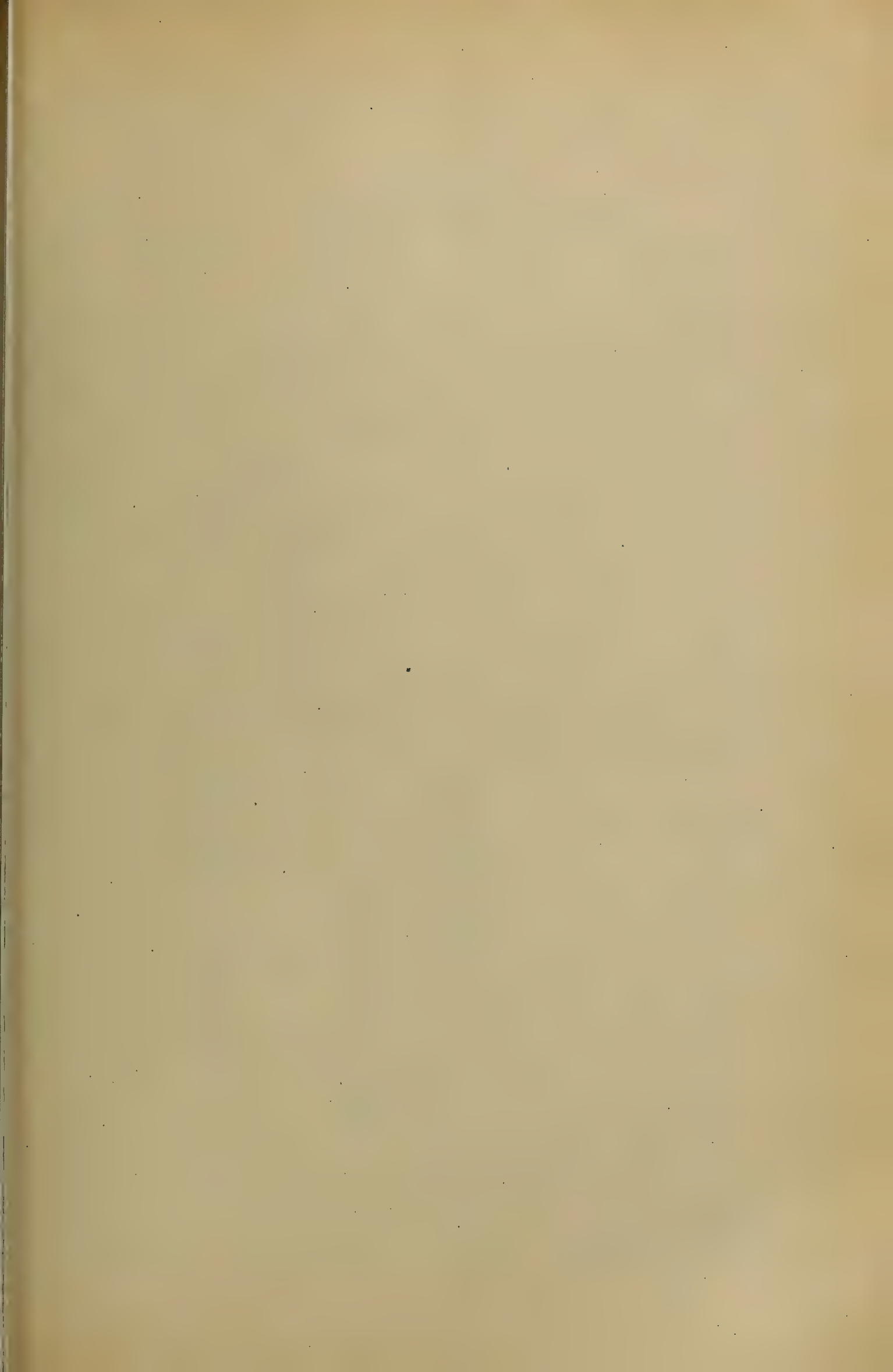
4. An apparatus for making flat sound-records, comprising two end plates, a center-pin secured to one of said end plates, matrices
45 fitted on said center-pin and engaging the respective end plates, said matrices having molding-grooves on their opposing surfaces, and an intermediate plate likewise fitted on said center-pin and adapted to form a backing for the record material.

In testimony whereof I have hereunto set
55 my hand in the presence of two subscribing witnesses.

WILLIAM HELM HOYT.

Witnesses:

ELEANOR J. ADAMS,
EDWIN F. HALL.



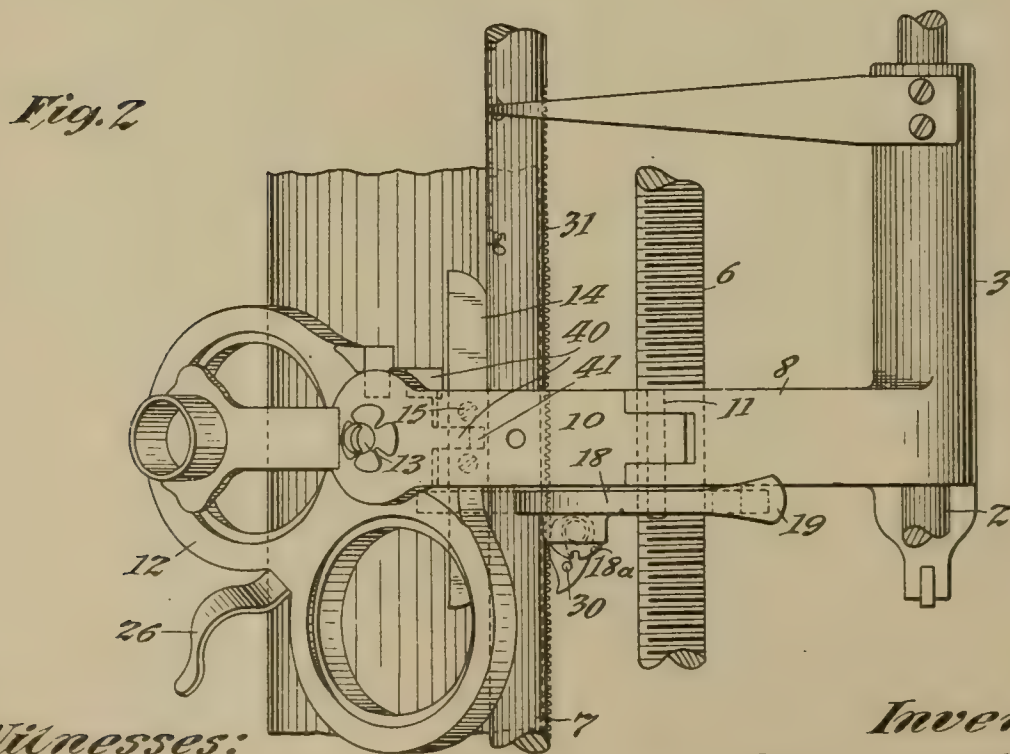
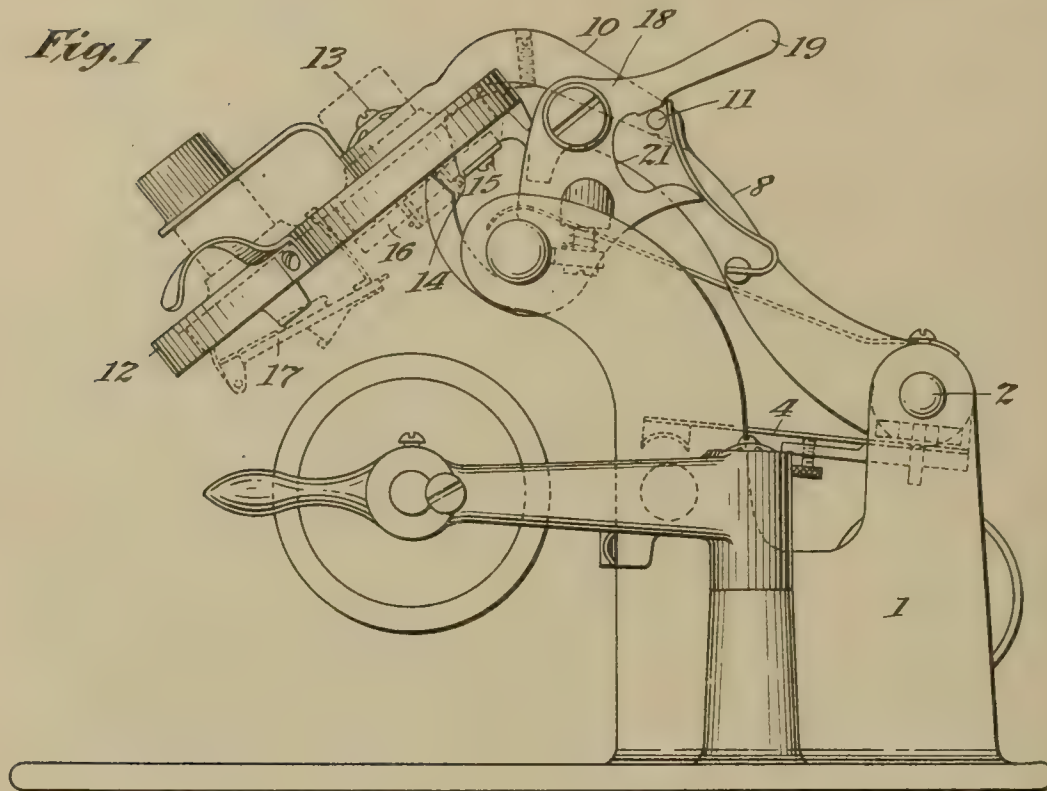
No. 847,631.

PATENTED MAR. 19, 1907.

E. L. AIKEN.
PHONOGRAPH.

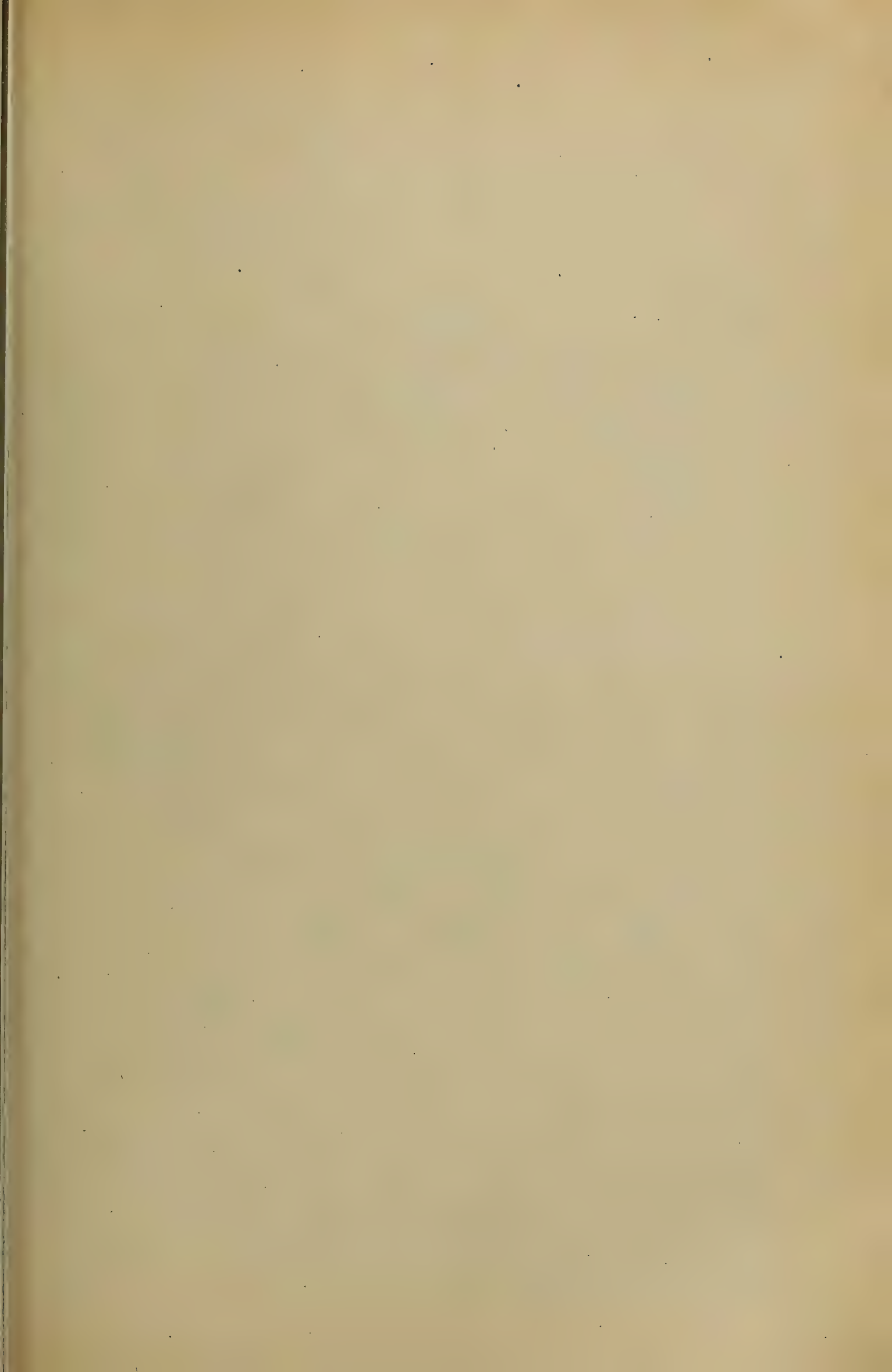
APPLICATION FILED FEB. 20, 1906.

2 SHEETS—SHEET 1.



Witnesses:
Frank D. Lewis
Delos Holden

Inventor:
Edward L. Aiken
by Frank L. Spier *Atty.*



No. 847,631.

PATENTED MAR. 19, 1907.

E. L. AIKEN.
PHONOGRAPH.

APPLICATION FILED FEB. 20, 1906.

2 SHEETS—SHEET 2.

Fig. 3

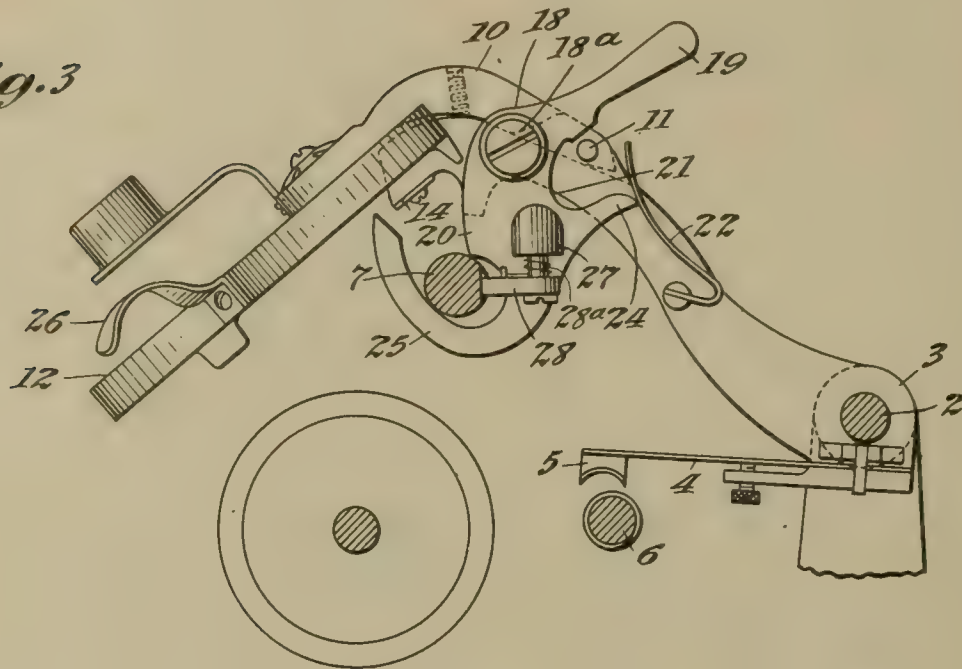


Fig. 5

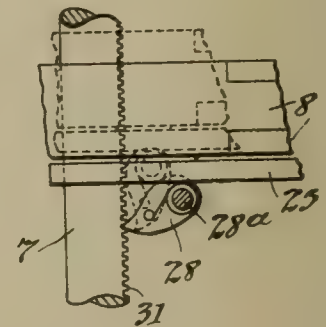
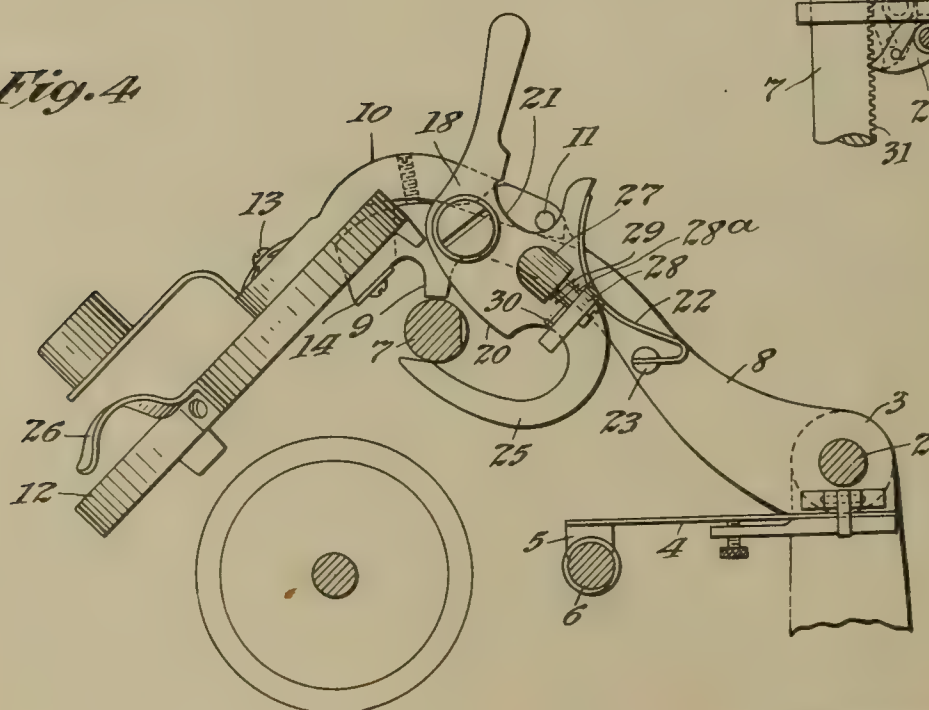


Fig. 4



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Edward L. Aiken
by Frank L. Aiken
Atty.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 847,631.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed February 20, 1906. Serial No. 301,981.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and more particularly to phonographs of the type shown in United States Patent No. 772,485, granted October 18, 1904, to Weber and Hibbard.

My invention has for its object the provision of improved means for raising and lowering the arm which carries the reproducer or recorder and for causing the same to be stepped in a rearward direction whenever desired, said means being adapted to prevent accidental displacement of the recorder or reproducer with respect to the record-surface, especially when the instrument is being used by beginners or those not particularly skilful in its use.

My invention also comprises certain other details of construction, which will be hereinafter fully set forth.

Referring to the accompanying drawings, Figure 1 is an end view of a phonograph embodying my invention, the recorder or reproducer frame being elevated so that the feed-nut is disengaged from the feed-screw. Fig. 2 is a broken plan view of the same. Fig. 3 is a view similar to Fig. 1, certain of the parts being removed for the sake of simplicity and clearness and shows the positions assumed by the parts when the recorder or reproducer carrier-arm is elevated and is being stepped in a rearward direction. Fig. 4 is a similar view showing the parts when the recorder or reproducer is in operative position with respect to the rotating record or blank. Fig. 5 is a detail plan view of the mechanism for stepping the carrier-arm rearward.

The phonograph shown comprises a body 1 and back rod 2, which extends transversely thereof and upon which the sleeve 3 is mounted to slide in the usual manner, said sleeve carrying the usual feed-nut spring 4 and feed-nut 5. Parallel with the rod 2 is the feed-screw 6, which operates in the usual manner to impart forward movement to the

sleeve 3. Parallel with the rod 2 is a front guide-rod 7, which is adapted to support the forward end of the carrier-arm 8, extending forward from and preferably integral with the sleeve 3. This arm is provided with a depending projection 9, which rests upon the rod 7 when the feed-nut is in engagement with the feed-screw, as shown in Fig. 4. An auxiliary arm 10 is pivoted on a pin 11, carried by the arm 8. The arm 10 carries a spectacle-frame 12, which is pivoted on a screw 13, carried by the said arm, said spectacle-frame being adapted to turn on its pivot, so as to bring either the recorder or reproducer into operative position, as desired, the spectacle-frame being provided with a pair of lugs 40, which are adapted to engage a notch 41 in the end of the arm 8 and lock the said frame when lowered into operative position and to be disengaged from said notch when the spectacle-frame is raised by lifting upon the finger-piece 26, so that the auxiliary arm 10 turns on the pivot-pin 11.

In order that the recorder and reproducer may operate upon blanks or records which vary gradually in diameter, it is desirable that recorders and reproducers of the floating-weight type be used in which the weights have a large range of movement. In using such instruments it is desirable to provide means for sustaining the weight belonging to the reproducer when the recorder is in operative position, and vice versa, because especially when operating upon a large blank the weight belonging to the inactive instrument would be likely to occupy a position sufficiently low as to bring the stylus thereof into contact with the record-surface. In order to prevent this, a plate 14 is secured to the forward end of the arm 8 by screws 15, its position being such that when the spectacle-frame is in position for the recorder to operate upon the blank, as in Fig. 1, the weight 16 of the reproducer will rest upon one end of the said plate 14, and, vice versa, when the reproducer is in operative position the weight 17 of the recorder will rest upon the other end of the plate 14.

The means for elevating the carrier-arm 8 comprises a lift-lever 18 of peculiar form. This lever is pivoted on a screw 18^a, secured to the arm 8, so as to turn on a horizontal

axis parallel to the rod 7. The finger-piece 19 extends outward from the body of the lever 18, so that it may be readily manipulated by the operator for moving the lever, which is provided with a cam-surface 20, so situated as to be brought into operative contact with the supporting-rod 7 as the lever is turned on its pivot, thus effecting the elevation of the arm 8 from the position of Fig. 4 to that of Fig. 1. The body of the lever 18 is cut away, as shown at 21, to receive the end of the pin 11, which operates as a stop for the lever 18 in both directions, as shown in Figs. 1 and 4. A flat spring 22 is secured at one end to the arm 8 by a stud 23 and is arranged to press against the arm 17 and hold it in either of its extreme positions. In one position the spring presses against a concave surface formed upon the rear edge of the lever 18, as shown in Fig. 4, and in the other extreme position the spring presses upon the end of the tooth 24, as in Fig. 3. The lever 18 also carries a hook 25, the end of which is immediately below the rod 7 when the arm 8 is depressed and the feed-nut in engagement with the feed-screw. In this position the hook 25 prevents the arm 8 from being raised. This is desirable, because in shifting the spectacle-frame the operator seizes the finger-piece 26, so as to raise the arm 10, and as the pivotal movement of said arm on the pin 11 is limited there would be a tendency to move the arm 8, so as to release the feed-nut 5 from the feed-screw, and it would then be possible for the arm 8 to slide along the rod 2, thus displacing the recorder or reproducer with respect to the record-surface. With the structure shown, however, the spectacle-frame may be readily shifted, and it is impossible in this way to move the arm 8 either vertically or laterally.

The lever 18 is provided with a boss or projection 27, in which a screw 28^a is mounted. Pivoted upon said screw is a pawl 28, which is normally held in the position shown in Fig. 4 by a coil-spring 29, secured at one end to the screw 28^a or boss 27 and at the other end to a small pin 30, carried by the pawl. The rear surface of the rod 7 is provided with teeth forming a rack 31, the said teeth being adapted to be engaged by the pawl 28 when it is desired to step the arm 8 a short distance in a rearward direction. This is accomplished by the movement of the lever 18, which first effects the elevation of the arm 8 by the coöperation of the cam-surface 20 and rod 7, so as to separate the feed-nut and the feed-screw, and a further movement brings the end of the pawl 28 into engagement with one of the teeth of the rack 31, as shown in Figs. 3 and 5. A further movement of the lever 18 causes the pawl to move the arm 8 rearward, since the free end or point of the pawl is held by the rack, causing the pin 28^a to move in an arc described about the point

of the pawl as a center until the said point leaves the rack 31, as shown in Fig. 2, the lever 18 being then in its extreme position. When the parts assume this relation, the sleeve 3 can be moved freely upon the rod 2 and the recorder or reproducer brought into any desired position with respect to the record-surface. The movement of the lever 18 has stepped the arm 8 a short distance rearwardly, and, if desired, the lever may be operated a second time in order to double this distance; but ordinarily a single movement of the lever will be sufficient to enable the operator to recognize the last few words upon the record, which is the purpose for which the reproducer is usually stepped rearward. Of course a very slight movement of the lever 18 from the position of Fig. 4 will raise the feed-nut from the feed-screw and enable the arm 8 to be moved laterally, if desired.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm and a lift-lever applied to said arm so as to be capable of a simple pivotal movement in a plane and provided with a cam-surface which coöperates with said guide to lift the carrier-arm, and an extension which prevents the raising of said arm when the lift-lever is in its down position, substantially as set forth.

2. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever applied to said arm so as to be capable of a simple pivotal movement in a plane and provided with a cam-surface which coöperates with said guide to lift the carrier-arm, and a hook or extension which is located immediately below said guide, when the lift-lever is in its down position, substantially as set forth.

3. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever pivoted to said arm on a horizontal axis and provided with a cam-surface which coöperates with said guide to lift the carrier-arm and an extension which prevents the raising of said arm when the lift-lever is in its down position, substantially as set forth.

4. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever pivoted to said arm on a horizontal axis and provided with a

cam-surface which coöperates with said guide to lift the carrier-arm, and a hook or extension which is located immediately below said guide when the lift-lever is in its down position, substantially as set forth.

5 5. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever pivoted to said arm, said lever being provided with a cam-surface normally below said guide which coöperates with said guide to lift the carrier-arm, and a shoulder beyond said cam-surface adapted to rest upon said rod when the lift-lever is in its up position, substantially as set forth.

6. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm and a lift-lever pivoted to said arm and provided with a cam-surface normally below said guide which coöperates with said guide to lift the carrier-arm, and a spring applied to said lever to hold the same in its down position, substantially as set forth.

7. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever pivoted to said arm and provided with a cam-surface normally below said guide which coöperates with said guide to lift the carrier-arm, and a spring applied to said lever to hold it in its up position, substantially as set forth.

8. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and a lift-lever pivoted to said arm and provided with a cam-surface normally below said guide which coöperates with said guide to lift the carrier-arm, and a double-throw spring applied to said lever to hold it in either its up or down position, substantially as set forth.

9. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, and provided with a rack, and a lift-lever pivoted to said arm on a horizontal axis, said lift-lever being provided with a pawl adapted to engage with said rack at or

near the end of the lifting operation of said lever so as to impart a lateral movement to the carrier-arm, substantially as set forth. 60

10. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm and provided with a rack, a lift-lever pivoted to said arm on a horizontal axis, said lift-lever being provided with a pawl adapted to engage with said rack at or near the end of the lifting operation of said lever so as to impart a lateral movement to the carrier-arm, and a stop for limiting the pivotal movement of said lift-lever, substantially as set forth. 65 70

11. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm and provided with a rack, a lift-lever pivoted to said arm on a horizontal axis, said lift-lever being provided with a pawl adapted to engage said rack at or near the end of the lifting operation of said lever so as to impart a lateral movement to the carrier-arm, and a stop for limiting the movement of said lift-lever in both directions, substantially as set forth. 75 80 85

12. In a phonograph, the combination with a traveling carrier-arm, of a pivoted spectacle-frame carried thereby and adapted to sustain a reproducer and recorder, and a support traveling with said carrier-arm and so located as to receive and sustain the floating weight of the reproducer or recorder when the spectacle-frame is turned so as to bring said reproducer or recorder into an inactive position, substantially as set forth. 90 95

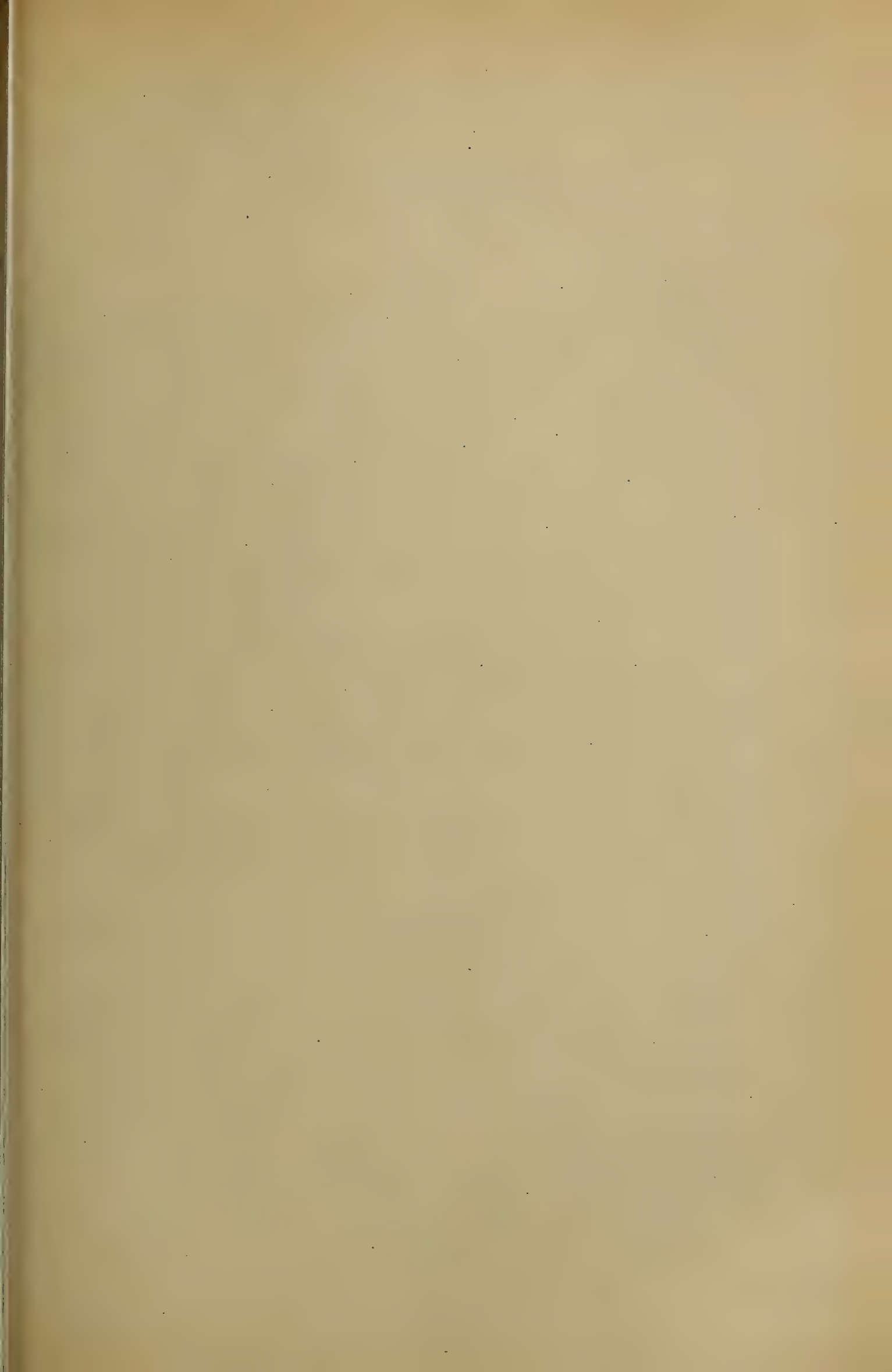
13. In a phonograph, the combination with a carrier-arm and means for progressively moving the same when in a lowered position, of a guide for supporting the free end of the carrier-arm, a pivoted spectacle-frame carried thereby and a transverse support secured to said carrier-arm in position to receive and sustain the floating weight of the reproducer or recorder when the spectacle-frame is turned so as to bring said reproducer or recorder into an inactive position, substantially as set forth. 100 105

This specification signed and witnessed this 2d day of February, 1906.

EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.



No. 847,687.

PATENTED MAR. 19, 1907.

A. N. PIERMAN.
PHONIC APPARATUS.
APPLICATION FILED OCT. 14, 1905.

3 SHEETS—SHEET 1.

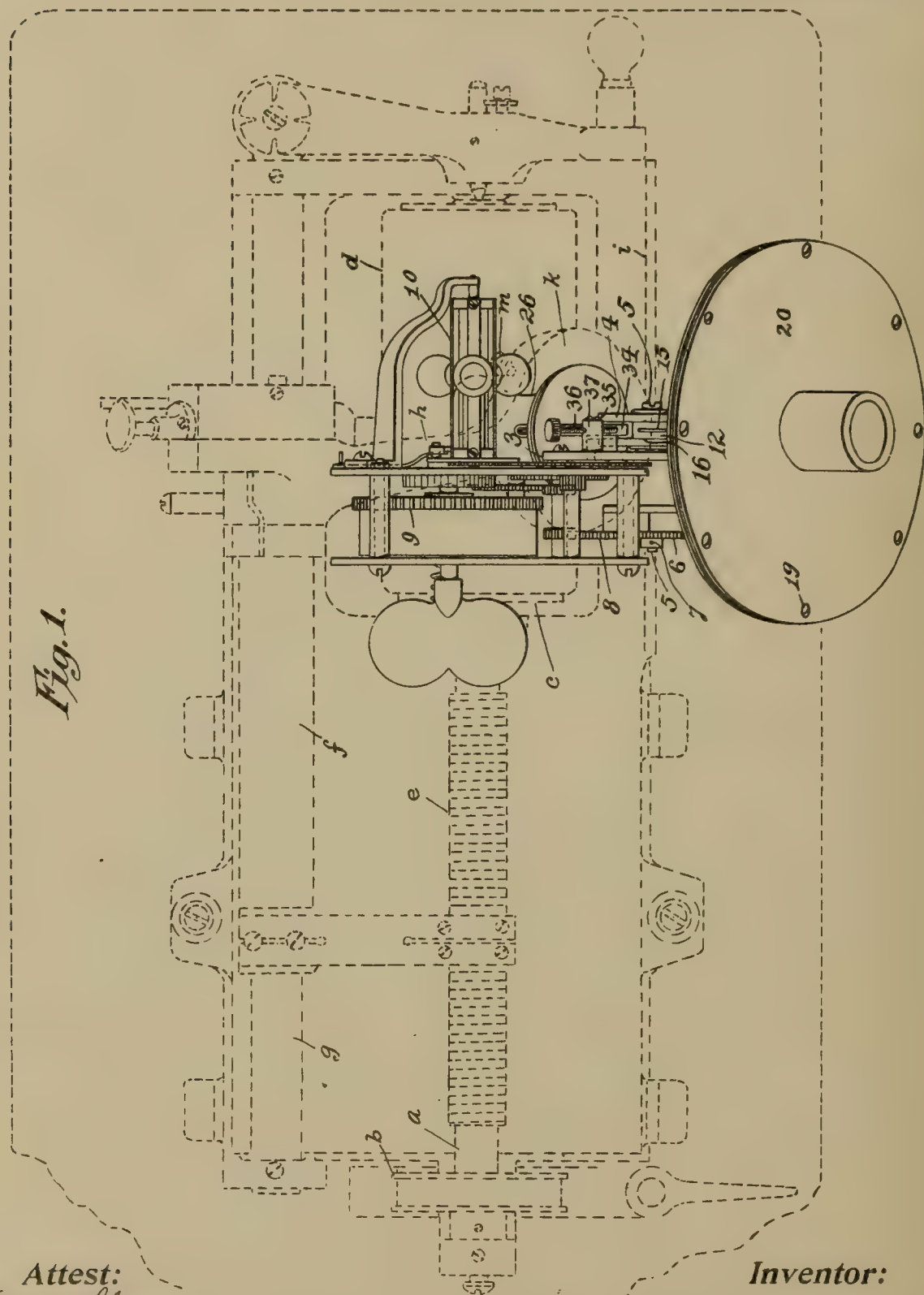
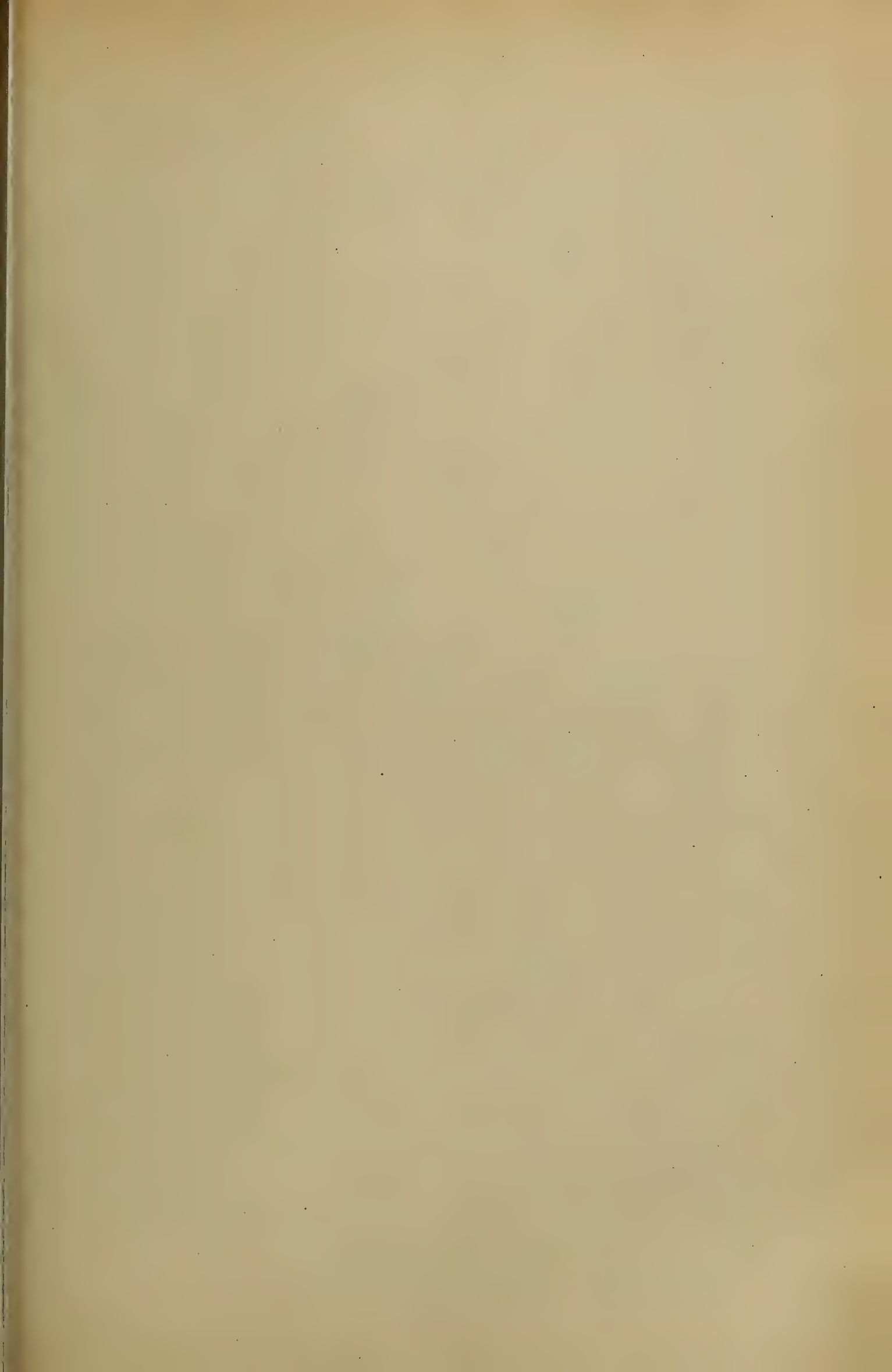


Fig. 1.

Attest:
Edgeworth
De los Holden

Inventor:
Alexander N. Pierman
by *Frank C. Spear* Att'y.



No. 847,687.

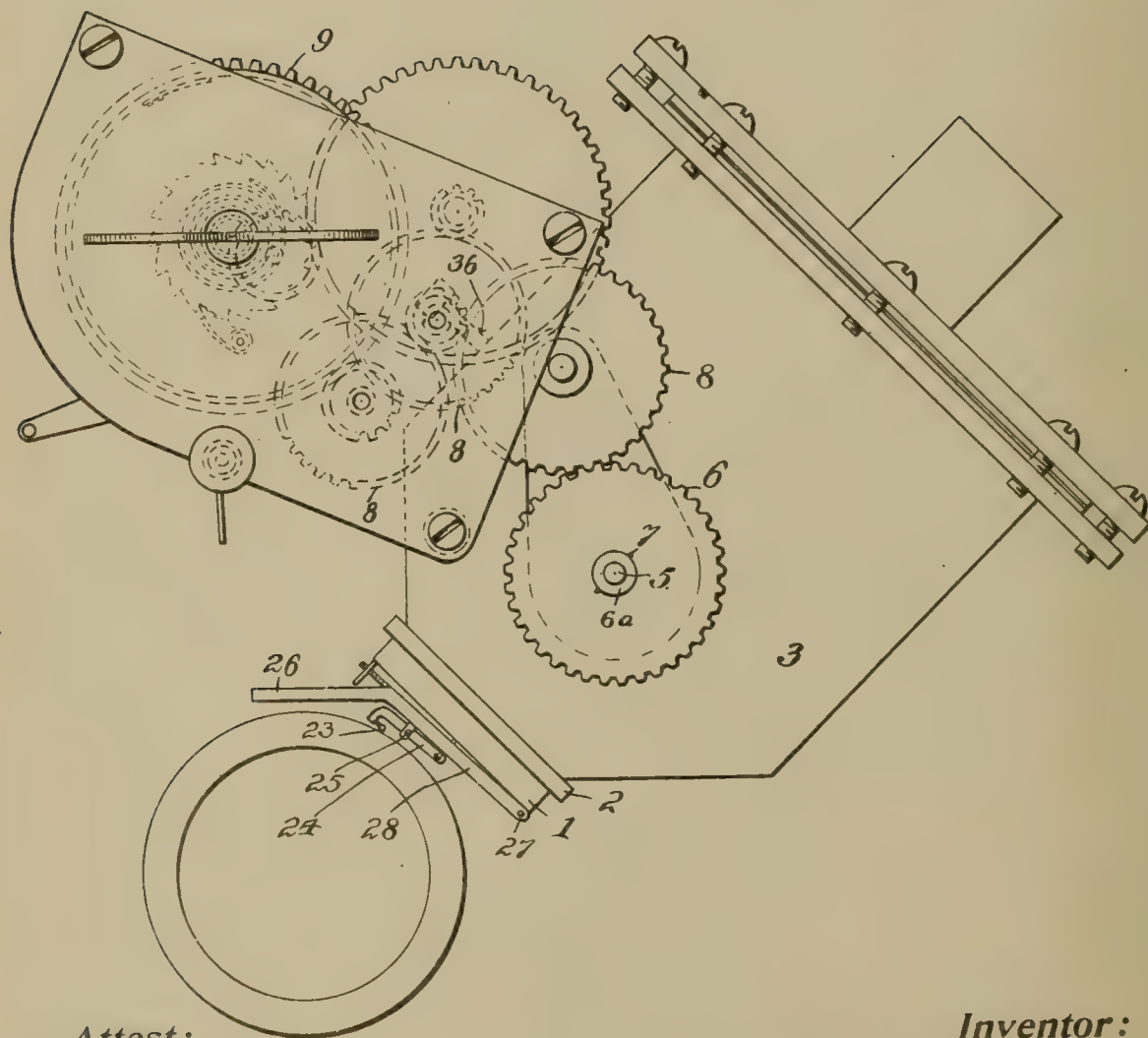
PATENTED MAR. 19. 1907.

A. N. PIERMAN.
PHONIC APPARATUS.

APPLICATION FILED OCT. 14, 1905.

3 SHEETS—SHEET 2.

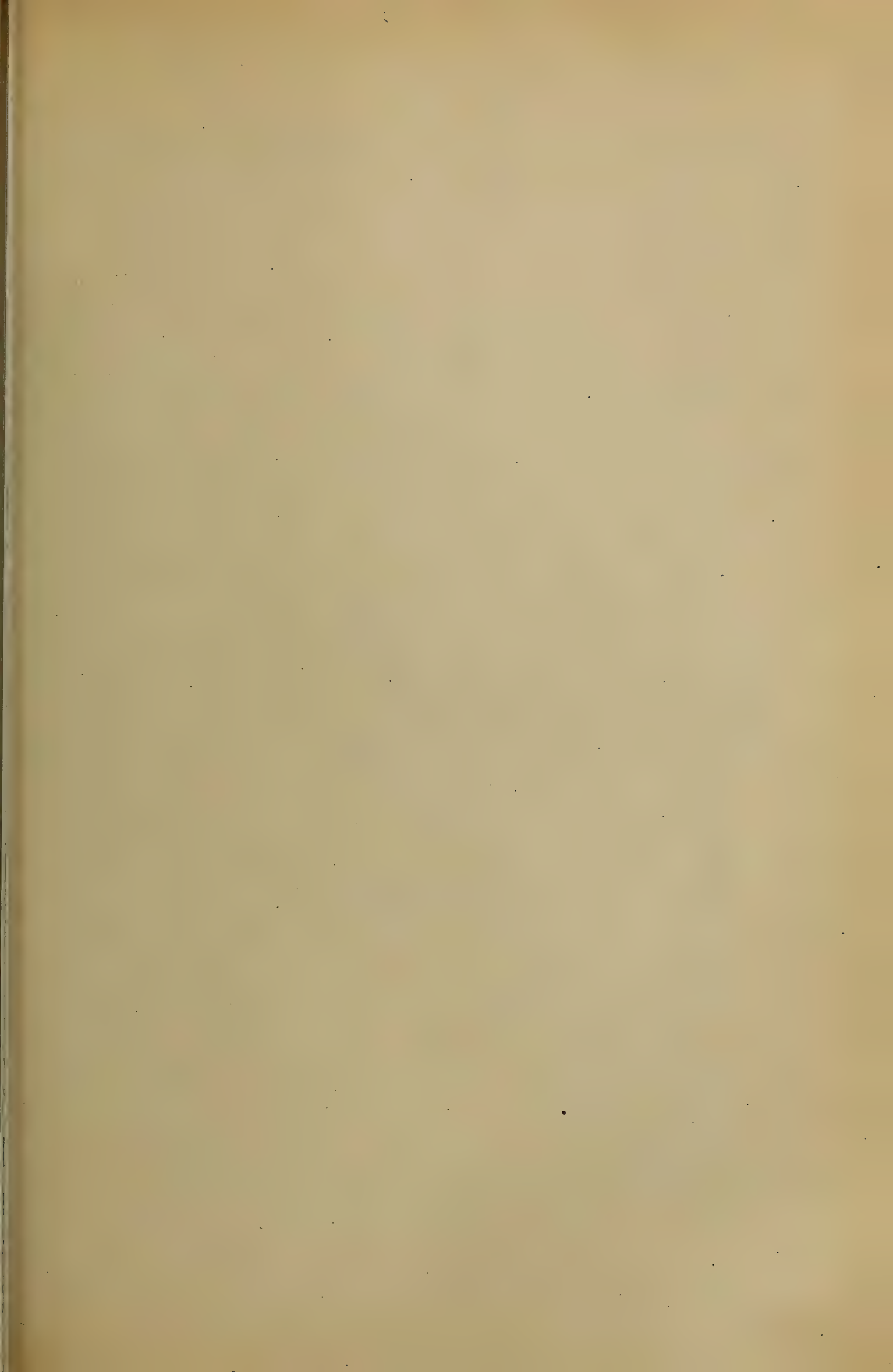
Fig. 2.



Attest:
Edgeworth Greene
Delos Holden

Inventor:

Alexander A. Pierman
by O
Frank L. Rogers, Atty.



No. 847,687.

PATENTED MAR. 19, 1907.

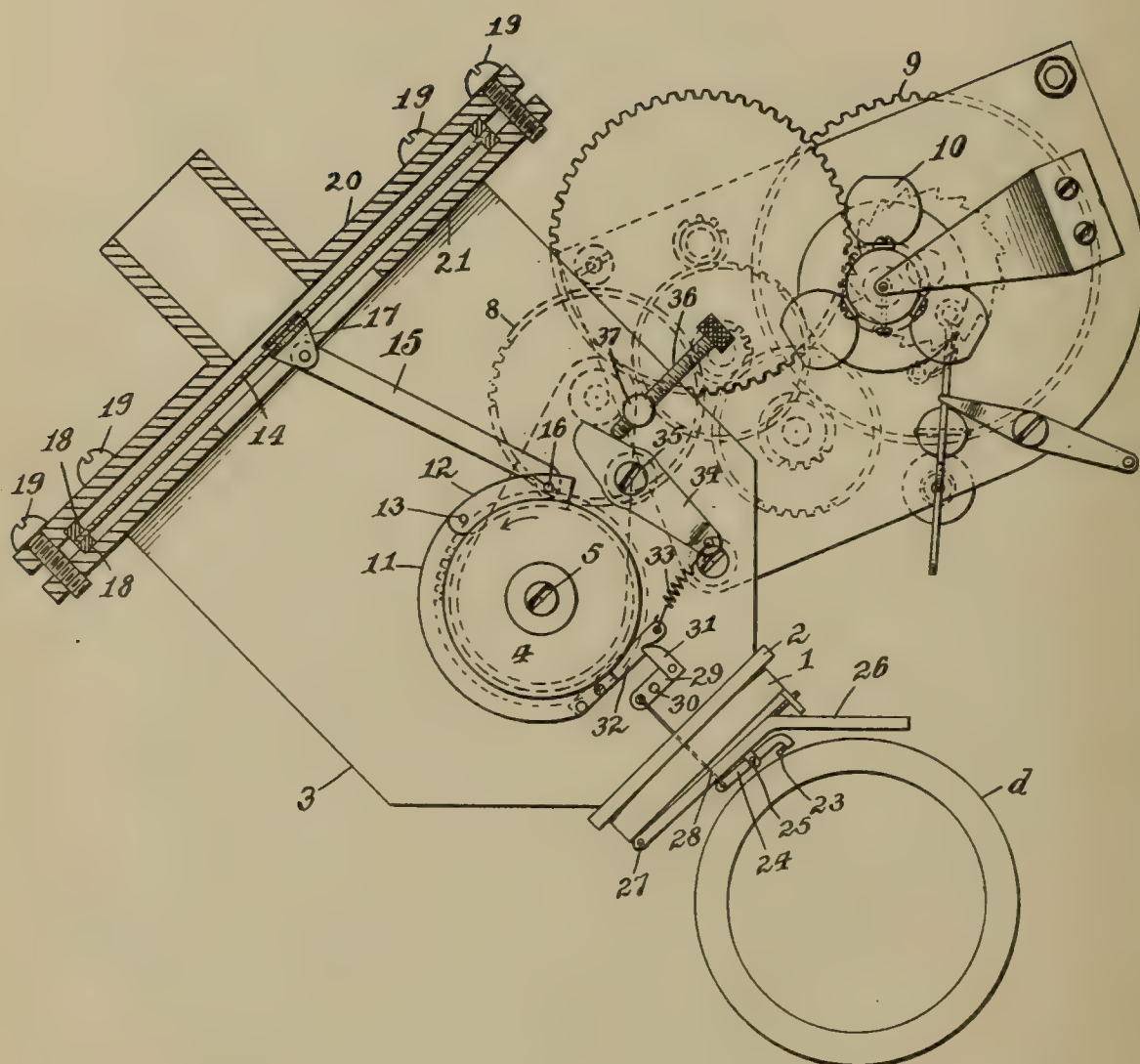
A. N. PIERMAN.

PHONIC APPARATUS.

APPLIOATION FILED OCT. 14, 1905.

3 SHEETS—SHEET 3.

Fig. 3.



Attest:
Edgeworth Greene
 De los Holden

Inventor:

by *Alexander A. Porman*
Frank L. Ives Att'y.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONIC APPARATUS.

No. 847,687.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed October 14, 1905. Serial No. 282,710.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonic Apparatus, of which the following is a description.

My invention relates to phonic apparatus of the type wherein a rotating friction-wheel is used in combination with a friction-shoe pressed against the same, power being applied for rotating the friction-wheel, and the pressure between the friction-shoe and friction-wheel being varied by suitable means representative of sound-vibrations, thus producing variations in the amount of friction, which by suitable mechanical connections may operate a diaphragm or other phonic apparatus.

My invention relates more particularly to devices for reproducing sounds through the instrumentality of a phonographic record, the phonographic stylus being connected with said friction-shoe and operating to vary the amount of friction.

Heretofore, as far as I am aware, the friction-wheel has always been driven from a stationary motor, and the said friction-wheel has either been mounted so as to have no progressive motion or in case it has been mounted on a traveling carrier the driving mechanism has been so arranged that the friction-wheel may receive its power from the said stationary motor during its movement with the carriage. These devices are objectionable, however, because they are not readily applicable to an ordinary phonograph and require special forms of instruments, which are expensive to construct and which in some cases cannot be used with an ordinary phonographic speaker.

My invention has for its general object the provision of a mechanism of the character referred to and more particularly its application to a phonograph of ordinary construction, so that the mechanism may be interchangeable with an ordinary phonographic reproducer without the addition of any parts whatsoever to the ordinary phonograph. This object has been carried out by the mounting of a complete frictional reproducing apparatus upon a base which is adapted to fit within the ordinary car-

rier-arm of a phonograph or other talking-machine, the friction-wheel being driven by a motor carried upon a suitable frame secured to or integral with the frame upon which the various operating parts of the reproducing mechanism are carried, whereby the friction-wheel may be continuously driven during the progressive movement of the carrier-arm without the disadvantages resulting from the use of a stationary motor, and without the necessity of increasing the strength or power of the usual phonograph-motor to enable it to drive the friction-wheel in addition to the work of driving the mandrel and feed-screw.

Reference is hereby made to the accompanying drawing, in which—

Figure 1 is a plan showing in dotted lines a phonograph of ordinary construction and in full lines an embodiment of my invention applied thereto. Fig. 2 is a side elevation of my improved reproducer looking from the left of Fig. 1; and Fig. 3 is a similar view, partly in section, looking from the right of Fig. 1.

Corresponding parts are designated by the same reference numerals in the several views.

The phonograph shown in Fig. 1 is of the usual well-known construction and comprises a main shaft *a*, driven by means of any suitable stationary motor, (not shown,) such as a spring or electric motor, situated usually below the same and transmitting power thereto by means of a belt passing over the drive-pulley *b*. The shaft *a* carries at one end a mandrel *c*, upon which a cylindrical sound-record tablet *d* is held by frictional engagement. A feed-screw *e*, formed upon the shaft *a*, imparts a progressive forward movement to the carrier *f*, sleeved on the back rod *g*, the said carrier comprising an arm *h*, extending over the mandrel *c* and supported at its forward end upon a straight edge *i*, a circular eye *k* being formed in said arm to receive the recorder or reproducer. The parts thus described being well known form no part of my invention, except as combined with elements which I will now describe.

A circular base 1, having a flange 2, carries the frame 3, by which the friction-wheel 4 is carried. The base 1 is of a suitable size to fit within the eye *k* of the arm *h*, being held

herein by the usual set-screw *m*. The friction-wheel 4 is secured upon one end of a shaft 5 in any suitable manner, and the said shaft is journaled in a bearing carried by the frame 3. Upon the opposite end of the shaft 5 is a gear 6, secured in any suitable manner, as by a pin 7, passing through its hub 6^a. The gear 6 is driven by means of a gear-train 8, driven from a spring-barrel 9, the whole constituting a spring-motor provided with a governor 10 of any approved construction. Partially surrounding the friction-wheel 4 is a friction-shoe, comprising two parts 11 and 12, pivotally connected at 13. The part 12 is connected to a diaphragm 14 by a link 15, which is pivoted at 16 to the part 12 and at its opposite end to a lug or pivot-block 17, secured to the diaphragm. The diaphragm is clamped between gaskets 18 by means of screws 19, which pass through the plate 20 and are threaded in the plate 21, the latter plate being rigid with the frame 3. The reproducing-stylus 23 is carried at one end of a lever 24, which is pivoted at 25 to a lug depending from the compensating weight 26. This weight is pivoted at 27 to a pin or lug carried by the ring 1, whereby the stylus 23 may rise and fall to conform to inequalities or irregularities in the shape of the record-tablet. That end of the lever 24 opposite the stylus 23 is connected by a link 28 to a lever 29. This lever is pivoted at 30 to the frame 3 and has an arm 31, which engages a shoulder formed in the extension 32 of the friction-piece 11. A tension-spring 33 is connected at one end to the member 32 and at the other end to an adjusting-lever 34. The lever 34 is pivoted on a stud 35 and is adjusted by means of an adjusting-screw 36, threaded in a stud 37, carried by the frame 3, whereby any desired degree of tension of the spring 33 may be obtained.

It will be obvious that the rotation of the friction-wheel 4 in the direction indicated by the arrow will produce a thrust upon the diaphragm 14, which thrust will be diminished when the friction between the friction wheel and shoe is lessened and will be increased as the friction increases. The amount of friction between the friction-shoe and friction-wheel will be varied by the movements of the stylus 23 in accordance with the elevations and depressions of the sound-record groove of the tablet *d*. As the stylus rises the lever 24 draws the link 28 down, and the arm 31 of the lever 29 presses against the shoulder of the extension 32, thereby lessening the friction. The spring 33 operates to increase the friction when the arm 31 moves in the reverse direction, corresponding to a depression of the sound-record groove. The result is that the diaphragm 14 is thrown into vibrations corresponding to the elevations and depressions of the sound-record tablet and produces sounds corresponding to those recorded

upon the said tablet, the friction-wheel 4 being continuously driven by the spring-motor, which travels with it during the operation of the instrument. It will be obvious that other forms of motor may be mounted upon the frame 3 for driving the friction-wheel 4, if desired, such as an electric motor, water-motor, &c.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a phonic apparatus, the combination of a traveling carrier and means for progressively moving the same, a diaphragm, friction-wheel and motor carried by the carrier, a driving connection between said motor and friction-wheel, a friction member pressing against said friction-wheel, a connection between said friction member and diaphragm, and means representative of sound-vibrations for varying the amount of friction between the friction-wheel and friction member, substantially as set forth.

2. In a phonograph, the combination of a phonographic tablet, means for rotating the same, a carrier movable across said tablet, a stylus, diaphragm, friction-wheel and motor carried by said carrier, a driving connection between said motor and friction-wheel, a friction member pressing against said friction-wheel, and connections between said friction member and said stylus and diaphragm respectively, substantially as set forth.

3. In a phonograph, the combination with the mandrel, feed-screw, traveling carrier and means for driving the same, of a friction-wheel carried by said carrier and a motor traveling with and driving said friction-wheel, substantially as set forth.

4. In a phonograph, the combination of the mandrel, feed-screw, traveling carrier-arm extending over said mandrel and means for driving the same, of a friction reproducer attachment comprising a friction-wheel, friction member, diaphragm, reproducer-stylus, and a motor for driving said friction-wheel, said parts being mounted upon a base removably secured to said carrier-arm, substantially as set forth.

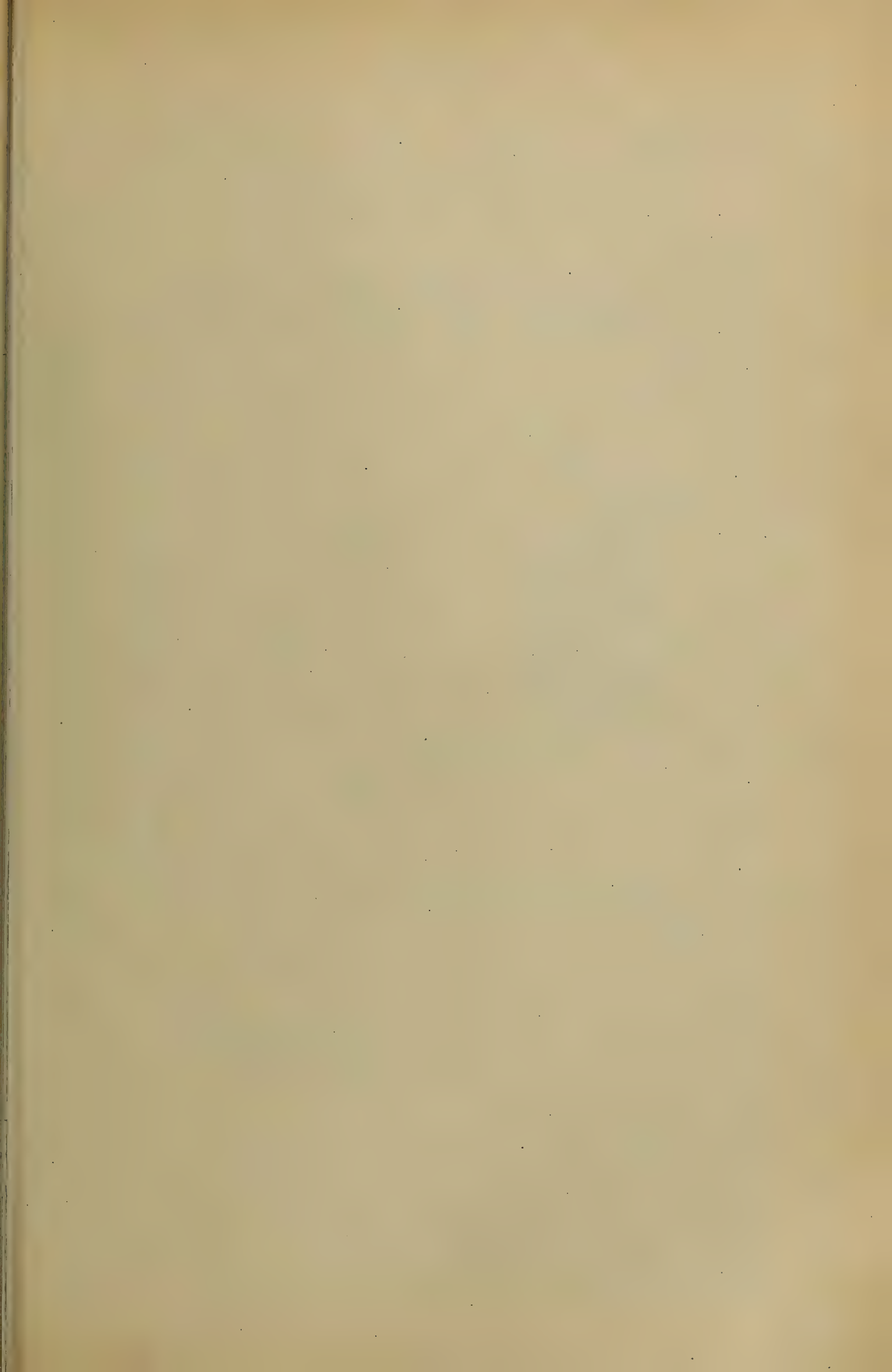
5. A friction reproducer attachment for phonographs and other talking-machines, comprising a frame or support adapted to be removably secured to the traveling carrier-arm of a talking-machine, said support carrying a friction-wheel, friction member, diaphragm, and motor for driving said friction-wheel, substantially as set forth.

This specification signed and witnessed this 12th day of October, 1905.

ALEXANDER N. PIERMAN.

Witnesses:

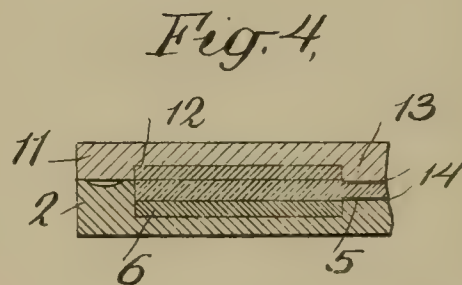
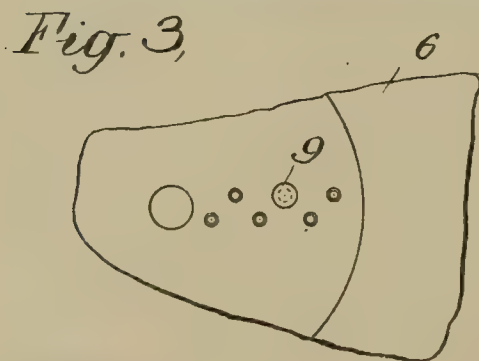
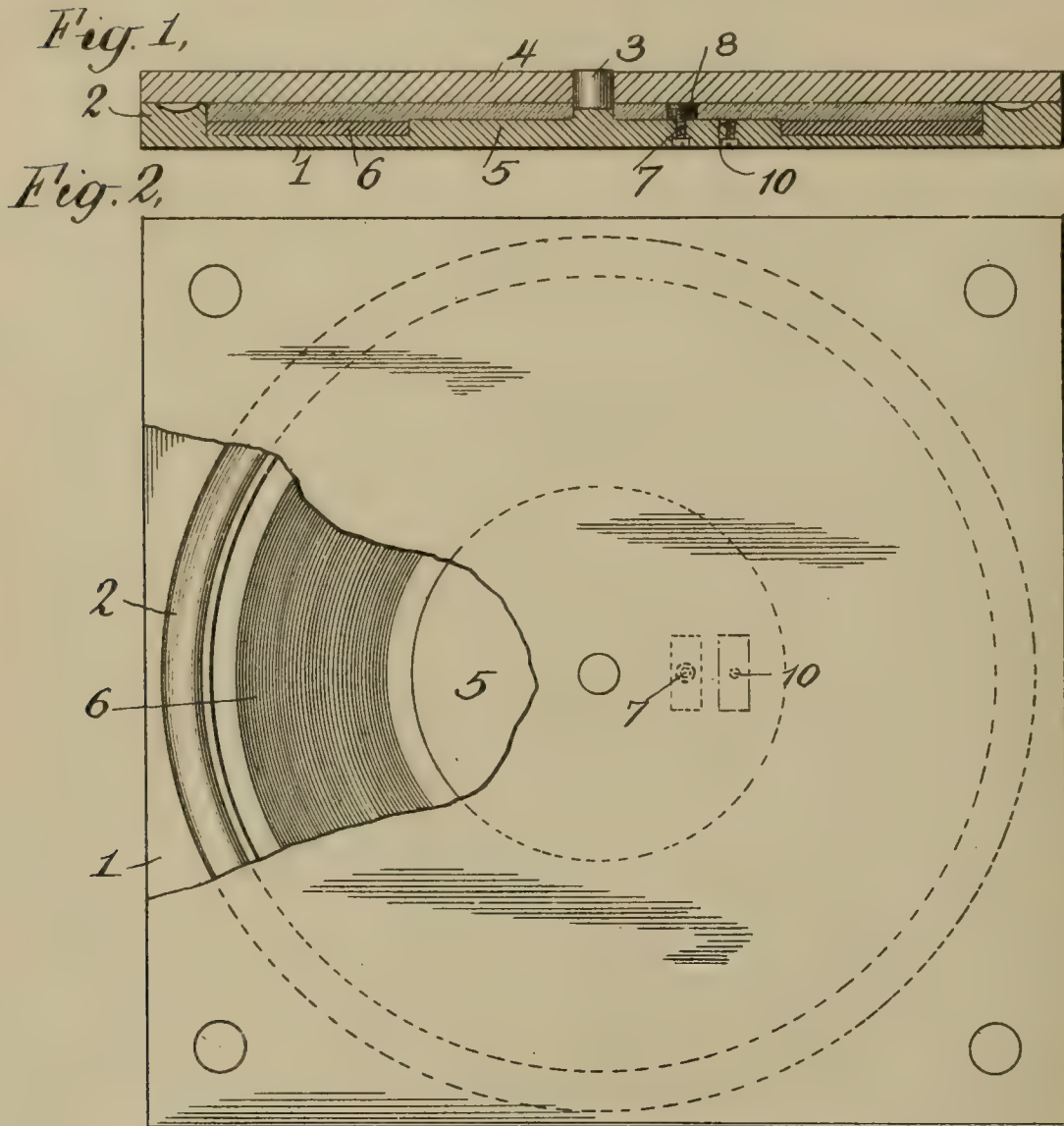
FRANK L. DYER,
DELOS HOLDEN.



No. 847,820.

PATENTED MAR. 19, 1907.

J. O. PRESCOTT.
MECHANISM FOR MAKING SOUND RECORDS.
APPLICATION FILED JAN. 15, 1907.



WITNESSES:
H. Edwards.
J. Mcintosh

INVENTOR
John O. Prescott
BY
J. P. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN O. PRESCOTT, OF SUMMIT, NEW JERSEY.

MECHANISM FOR MAKING SOUND-RECORDS.

No. 847,820.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed January 15, 1907. Serial No. 352,363.

To all whom it may concern:

Be it known that I, JOHN O. PRESCOTT, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Mechanism for Making Sound-Records, of which the following is a specification.

This invention relates to mechanism for making sound-records of the disk type for use with talking-machines by pressing a plastic composition upon a suitable matrix to form a disk having a spiral sound-record groove in one or both of its faces corresponding to the spiral projection on the matrix.

The object of the invention is to effect certain improvements in the construction of the mechanism for performing the pressing operation, by means of which improved apparatus the records may be manufactured more rapidly and at a materially-reduced cost.

Sound-records of the disk type as now commonly constructed have the record-groove formed on one or both faces adjacent the periphery, and the central portion of the disk is of less thickness than the portion having the groove therein. This central portion need not be of the greater thickness in order to give the requisite strength, and a saving of material is thus effected, and the shallow depression at the center of the disk may receive a label suitably marked with the name of the recorded sound and such other matter as is desired. My improved pressing mechanism is adapted for forming this depression at the center of the disk during the operation of forming the disk with the record-groove therein without the provision and manipulation of additional parts, and hence without consuming additional time. To this end a matrix of annular form is employed. Either it is originally made of this form or a circular opening is cut in its center of a diameter but little less than that of the inner convolution of the spiral ridge for forming the record-groove. Either one or each of the pressing members is provided with an annular depression in which the annular matrix fits snugly. To form this annular depression, the pressing member is provided with a flange bounding the outer edge of the depression and a central circular raised portion or projection, and this central projection is made of a height slightly greater than the thickness of the matrix. The matrix thus formed is placed in the annular depression in

the pressing member with the projection extending through its central opening and beyond its surface, and the plastic composition is pressed down upon it and the top of the projection and between the outer wall or flange and a central stud. The second pressing member may have a plane surface or both members may be somewhat similarly formed when it is desired to make a disk having a record-groove in both faces. A depression is thus formed in one or each of the faces of the record corresponding in size and depth to the portion of the projection extending beyond the surface of the matrix.

It is sometimes desired to provide sound-records with an opening in or through the central portion in addition to the central opening to receive a stud on the turn-table of the talking-machine. In accordance with my invention I provide means for positioning a stud upon one of the pressing members in any one of a plurality of positions varying in distance from the center. Stud of varying shapes may be employed to give the desired shape of opening in the disk, and the openings for receiving the securing means for the studs may be closed when not in use, so that the material will not enter therein.

I have illustrated an embodiment of my invention in the accompanying drawings, in which—

Figure 1 is a central section of the pressing mechanism. Fig. 2 is a top view of the same, broken away in part; and Figs. 3 and 4 are detail views showing modifications.

Referring to the drawings, 1 indicates the lower pressing member, consisting of a metallic plate having a circular flange 2 integral therewith. At the center of the member is a stud 3 for forming the central opening in the record and for centering the upper pressing member 4. Around the stud 3 is a circular raised portion or projection 5, integral with member 1 and forming between it and the flange 2 an annular groove to receive the annular matrix 6. The projection 5 is of greater height than the thickness of the matrix 6, the difference being equal to the depth of the depression to be formed at the center of the record. The matrix is either originally formed of annular shape or, if of disk form, a circular piece is punched out at the center, so that it will fit snugly in the annular groove in the member 1, its inner edge thereby abutting the wall of the projection 5 and its outer edge similarly abut-

ting the inner wall of the flange 2. The upper pressing member 4 is a metallic plate having a central opening therein through which the stud 3 may pass when the member is brought down upon the member 1. The flange 2 is of such height that when the member 4 engages it the two pressing members will be separated by the amount required to give the desired thickness of the record.

In order to form the opening in the central portion of the disk additional to the central opening, I provide in member 1 a plurality of threaded openings, into any one of which a screw 7 may be inserted to secure a stud 8 on the top of the projection 5. This stud may be of any desired shape, such as the oblong stud shown in Figs. 1 and 2 or the round one shown at 9 in Fig. 3. Its height is equal to the thickness of the record at the center thereof. Any one or more of the openings not in use may be closed by a screw 10, inserted in the opening with its end flush with the surface of the projection 5. Any number of openings for screws 7 may be provided, as shown in Fig. 3.

With the mechanism thus constructed, a stud 8 is selected with reference to the shape of opening it is desired to form in the record and secured in the desired position by a screw 7, the other openings for the screws 7 being closed by screws 10. The matrix is then positioned on the pressing member 1 about the projection 5. If a label is to be affixed to the record, this is preferably circular and of the same diameter as the projection 5 and has openings therein for the studs 3 and 8. The label is laid upon the top of projection 5 with the studs passing through the openings, as indicated at 14, Fig. 1. A charge of the plastic composition sufficient for one record is then placed upon the matrix and the member 4 lowered over the stud 3. Pressure is then brought to bear upon the two members 1 and 4 by a suitable pressing-machine to press them together and cause the composition to spread into and fill all parts of the space between the two members. This having been done and the composition having hardened, the member 4 is raised and the record removed. The record thus formed bears on one face a spiral groove corresponding to the ridge on the matrix, and at its center is a shallow circular depression in which a label is secured. In the central portion the record has a central opening formed by stud 3 and also an opening displaced from the center and of a size and shape determined by the shape of the stud 8 and the position in which it was mounted.

If it is desired to press records having record-grooves on both faces thereof, the upper pressing member may be formed somewhat similar to the lower one to provide an annular depression in which a second annular matrix is received and a central projec-

tion of a height slightly greater than the thickness of the matrix. Such a construction is shown in Fig. 4, in which 11 indicates the upper pressing member, 12 the second annular matrix lying therein, and 13 the projection for forming a shallow depression in the upper face of the record just as the projection 5 forms a similar depression in the lower face.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. Mechanism for making sound-records comprising the combination of a pressing member having an annular groove therein, an annular matrix lying in said groove, a central projection on said member of greater height than the thickness of said matrix, its side wall forming the inner wall of said annular groove, and a second pressing member for pressing the composition against said matrix and the top of said projection, substantially as set forth.

2. Mechanism for making sound-records comprising the combination of a pressing member having an annular groove therein, an annular matrix lying in said groove, a concentric projection integral with said pressing member and of greater height than the thickness of said matrix, its side wall forming the inner wall of said annular groove, and a second pressing member for pressing the composition against said matrix and the top of said projection, substantially as set forth.

3. Mechanism for making sound-records comprising the combination of a pressing member having an annular groove therein, an integral circular flange whose inner wall forms the outer wall of said groove, a circular concentric projection integral with said pressing member and of greater height than the thickness of said matrix, its side wall forming the inner wall of said annular groove, a central stud on said member, and a second pressing member having a central opening therein to receive said stud adapted for pressing the composition against said matrix and the top of said projection, substantially as set forth.

4. Mechanism for making sound-records comprising the combination of two pressing members one having a central stud and the other a corresponding opening and each of said members having an annular groove therein, an annular matrix lying in each of said grooves, a circular projection on each of said members of greater height than the thickness of the matrix in the groove therein, the side wall of each projection forming the inner wall of one of the annular grooves, and a circular flange on one of the pressing members bounding the annular groove therein and against which the other member abuts when the two members are pressed together to form a record, substantially as set forth.

5 5. Mechanism for making sound-records comprising the combination of a pressing member having an annular groove therein, an annular matrix in said groove, a projection on said member concentric with said groove, its side wall forming the inner wall of said groove, a stud mounted on the top of said projection, and a second pressing member for pressing the composition against said matrix and the top of said projection, substantially as set forth.

10 6. Mechanism for making sound-records comprising the combination of a pressing member having a circular flange thereon, a matrix upon said member within said flange, a second pressing member for pressing the composition against said matrix, a stud, and means for securing said stud in various positions upon one of said members, substantially as set forth.

20 7. Mechanism for making sound-records comprising the combination of a pressing member having a circular flange thereon, a matrix upon said member within said flange, a second pressing member for pressing the composition against said matrix, a stud, a

plurality of openings in one of said members, means coacting with any one of said openings for securing the stud upon the member, and means for closing the other openings, substantially as set forth.

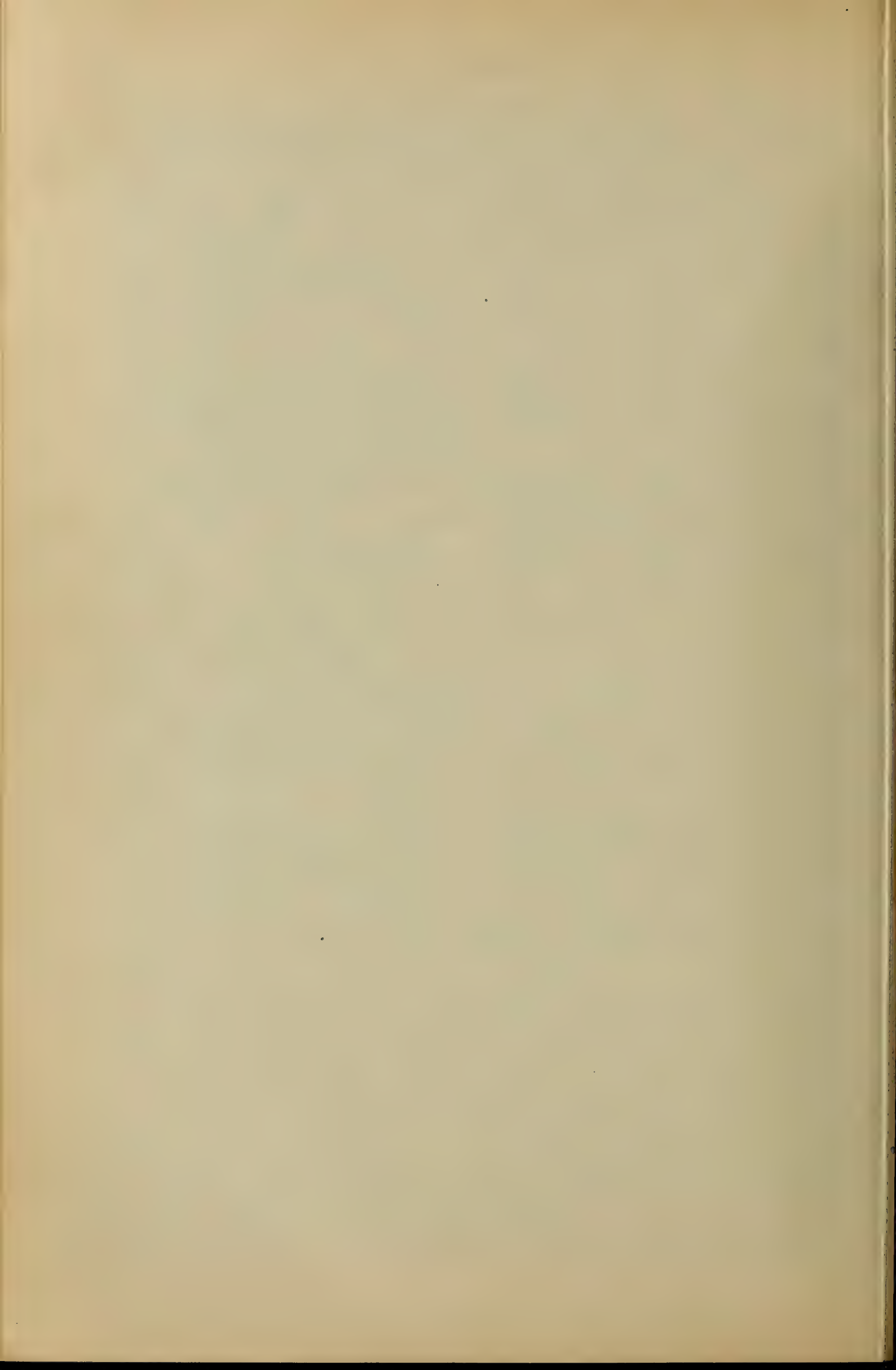
8. Mechanism for making sound-records comprising the combination of a pressing member having an annular groove therein, a circular flange thereon forming the outer wall of said groove, an annular matrix lying in said groove, a circular concentric projection integral with said member and of a height greater than the thickness of said matrix, its side wall forming the inner wall of said groove, a stud, means for securing the same in any one of a plurality of positions on the top of said projection, and a second pressing member for pressing the composition against said matrix and the top of said projection, substantially as set forth.

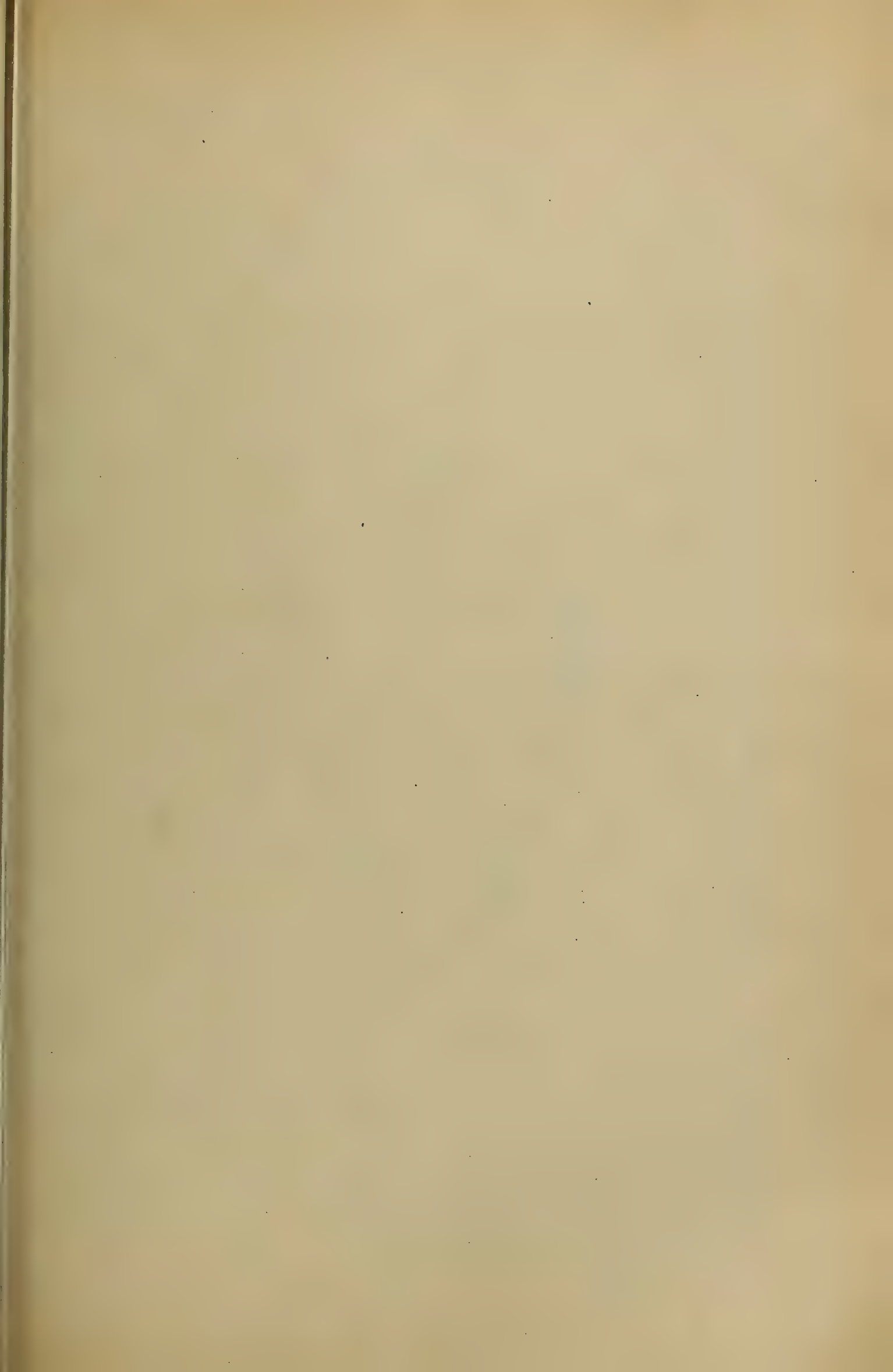
This specification signed and witnessed this 10th day of January, 1907.

JOHN O. PRESCOTT.

Witnesses:

S. O. EDMONDS,
D. S. EDMONDS.





No. 848,092.

PATENTED MAR. 26, 1907.

A. F. EELLS.
SEA SOUNDING.

APPLICATION FILED FEB. 23, 1907.

2 SHEETS—SHEET 1.

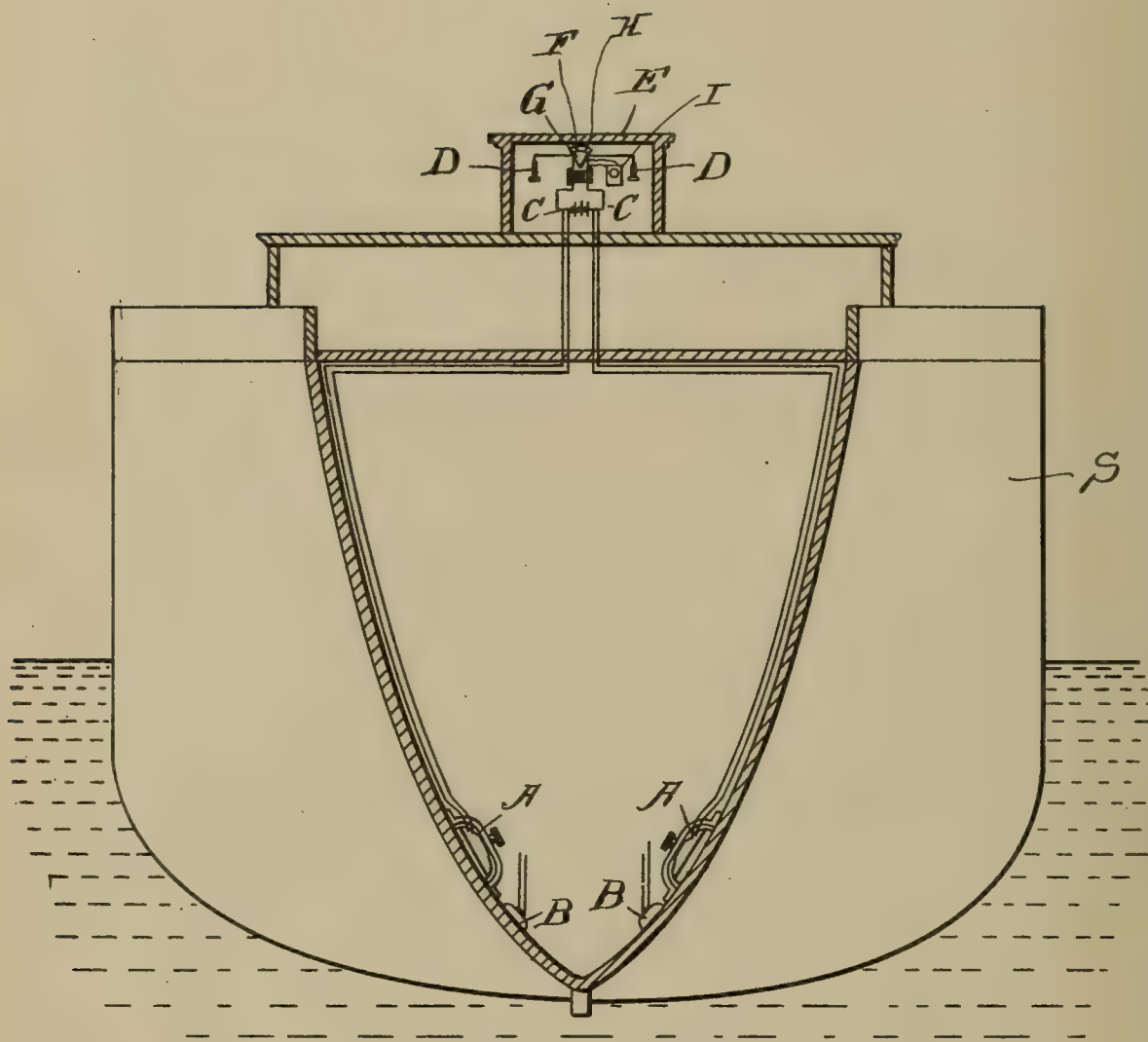


Fig 1.

Albert F. Eells ^{Inventor}

Witnesses
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E. M. Bond

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SEA SOUNDING.

APPLICATION FILED FEB. 23, 1907.

2 SHEETS—SHEET 2.

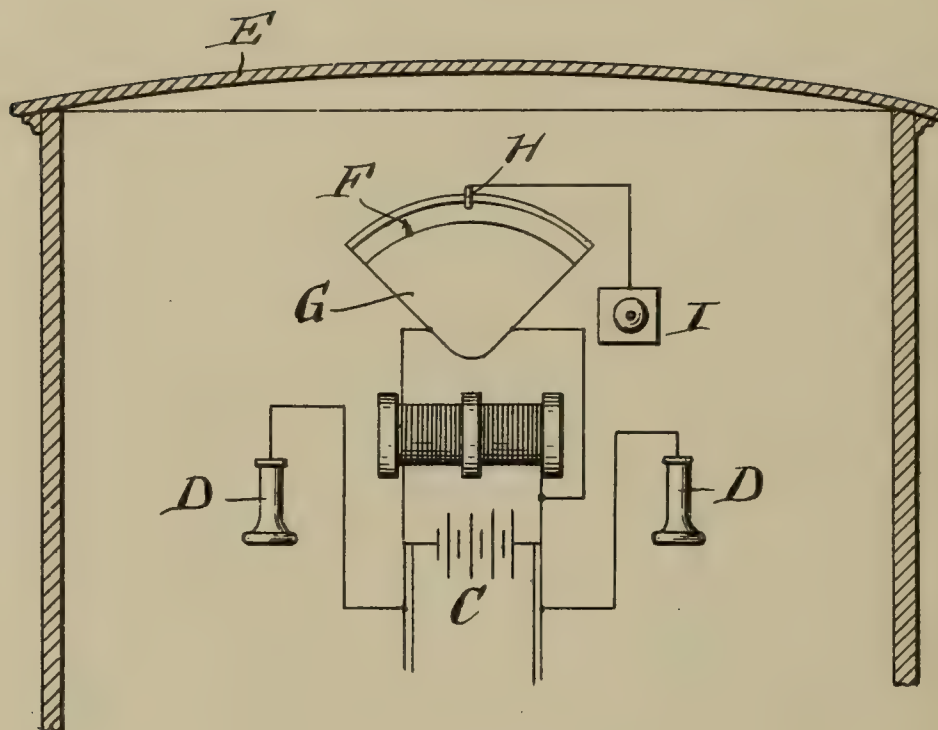


Fig. 2.

Witnesses
L. L. Armstrong
W. E. Collins

Inventor
Albert F. Eells

UNITED STATES PATENT OFFICE.

ALBERT F. EELLS, OF BOSTON, MASSACHUSETTS.

SEA-SOUNDING.

No. 848,092.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed February 23, 1907. Serial No. 358,924.

To all whom it may concern:

Be it known that I, ALBERT F. EELLS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, and whose post-office address is 101 Commercial street, in said city, have invented certain new and useful Improvements in Sea-Sounding, of which the following is a specification.

The present invention has for its objects, among others, to provide simple and efficient means for determining the depth of the water between the ship's keel and the bottom of the body of water through which the ship is passing and to automatically and electrically indicate the same in the pilot-house or other desired point on board the vessel.

The invention comprises, broadly, a device for determining the depth of the water by producing a sound within the submerged portion of the vessel, which sound passes through the material of the vessel and enters the surrounding water and is received back again into the vessel through the material of the latter and through a transmitter in contact with the submerged portion of the vessel and thence by electric wires to a receiver, the volume of the sound being indicated by suitable instrument, as a galvanometer. I may sometimes provide a signal, either visual or audible, actuated by the galvanometer to give notice when the water is of only a predetermined depth.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention in its preferred form is clearly illustrated in the accompanying drawings, in which—

Figure 1 represents a front view of a vessel with the forward body in vertical section. Fig. 2 is an enlarged cross-section of the pilot-house shown in Fig. 1 and showing more clearly the receiving and indicating mechanism.

I have found by experiment that sound produced within a vessel is very indistinct in deep waters, but grows louder as the water grows more shoal, and that by means of a transmitter secured to the frame or shell of the vessel within its submerged portion this sound is receivable and can be conveyed to the pilot-house, where by the volume of the sound the depth of the water may be determined and by a galvanometer or other

suitable instrument the depth can be indicated. The present invention contemplates the broad embodiment of this idea.

Referring to the drawings, S designates the vessel, and E the pilot-house thereof.

B is a sound-producing device, as an electric hammer of known construction, actuated in the usual way, the wires being shown as broken off. This serves to make a continuous sound within the submerged portion of the vessel. This sound travels through the wall of the vessel into the surrounding water, possibly to the bottom of the sea, and is echoed back through the wall of the ship and is received by a transmitter A, which is secured to the frame or shell of the vessel in any suitable manner and is preferably hermetically sealed to exclude moisture and to prevent injury to the same by condensation. This transmitter is connected by wires through the battery C and the magnet shown to the receiver D, which may be an ordinary telephone-receiver.

G is a suitable instrument, as a galvanometer suited to the purpose, properly connected, and which serves to indicate the volume of the sound—the shallower the water the louder the sound.

I may sometimes provide a signal, as a bell I, electrically connected and adapted to be set in operation by the pointer F of the galvanometer striking a contact H, which may be set at any desired point, so that when the water reaches a predetermined minimum depth the finger striking this contact will complete an electric circuit and sound the alarm. A light may be substituted for the bell, or both may be employed, one for day and the other for night.

One or more sounders and sound-receiving devices may be employed and also more than one receiver, and the transmitter employed is preferably one having a solid back with a granular carbon disk.

What is claimed as new is—

1. The method of determining the depth of water which consists in generating sound-waves, receiving them on an electric transmitter and then noting the loudness to determine the depth.

2. The method of determining the depth of water, which consists in generating sound-waves, receiving the same on an electric transmitter, and automatically indicating the depth.

3. The method of determining the depth

of water, which consists in generating sound-waves, receiving them on an electric transmitter, automatically indicating the depth and automatically actuating a signal when
5 a predetermined minimum depth has been reached.

4. A sea-sounding apparatus comprising means for generating sound-waves and means for electrically noting the volume of
10 the sound to determine the depth of water.

5. A sea-sounding apparatus comprising a vessel, means therein for generating sound-waves, a hermetically-sealed electric transmitter within the submerged portion of said
15 vessel and means for noting through said transmitter the volume of the sound and the depth of the water.

6. A sea-sounding apparatus comprising therein means for electrically generating
20 sound-waves, an electric transmitter affixed to a submerged portion of said vessel, means

for electrically indicating the depth and for sounding an alarm.

7. A sea-sounding apparatus comprising a vessel, means therein for generating sound- 25 waves, a hermetically-sealed transmitter secured within the submerged portion of said vessel, a receiver electrically connected with said transmitter, and means for automatically indicating the depth of the water by 30 volume of sound.

8. A vessel, a hermetically-sealed electric transmitter secured within and directly in contact with the submerged portion of said vessel and a receiver electrically connected 35 with said transmitter.

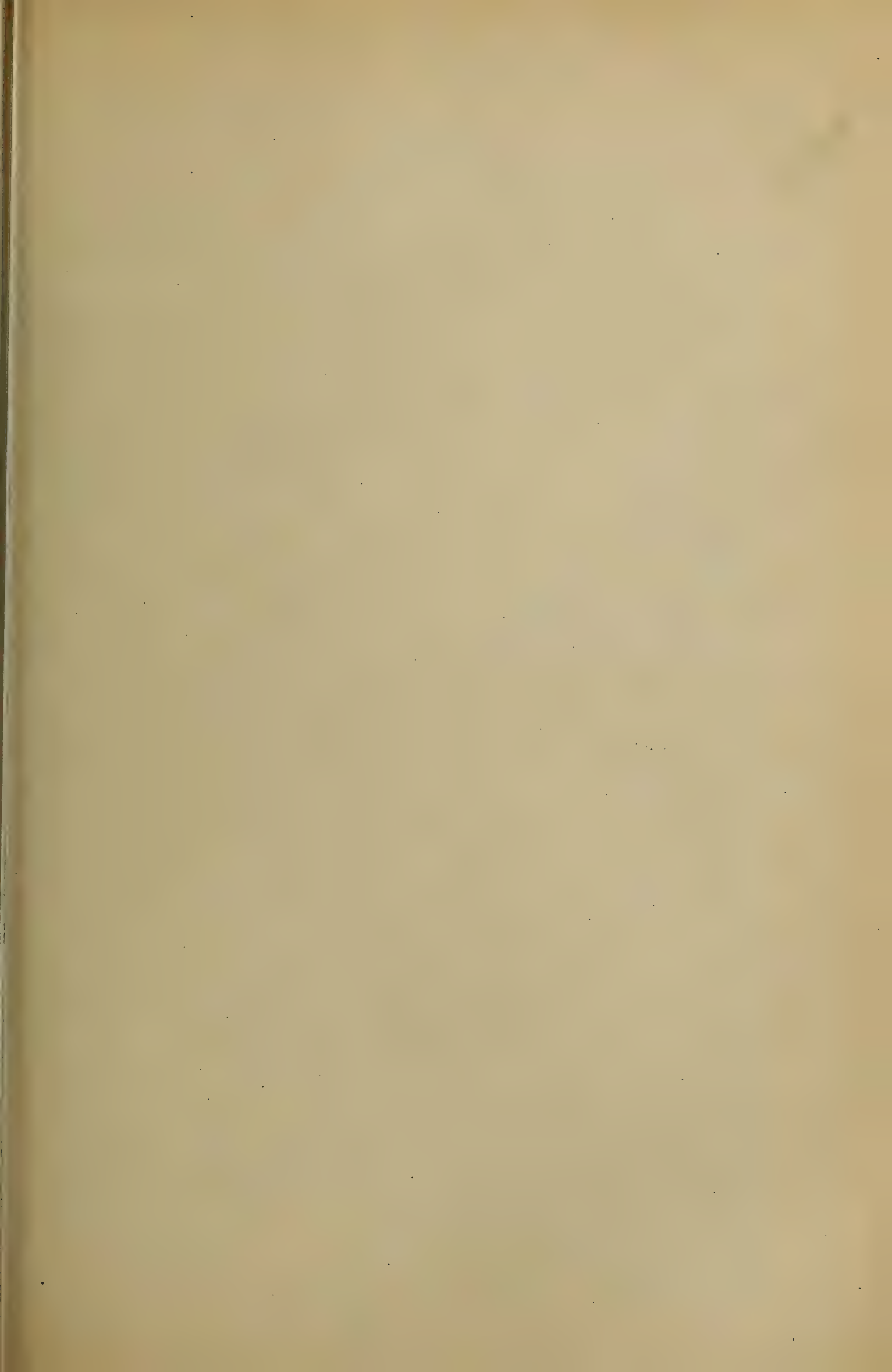
Signed by me at Washington, District of Columbia, this 23d day of February, 1907.

ALBERT F. EELIS.

Witnesses:

W. REES EDELEN,

A. W. HART.



No. 848,687.

PATENTED APR. 2, 1907.

C. RIDDERHOF.
PHONOGRAPH.

APPLICATION FILED SEPT. 27, 1905.

3 SHEETS—SHEET 1.

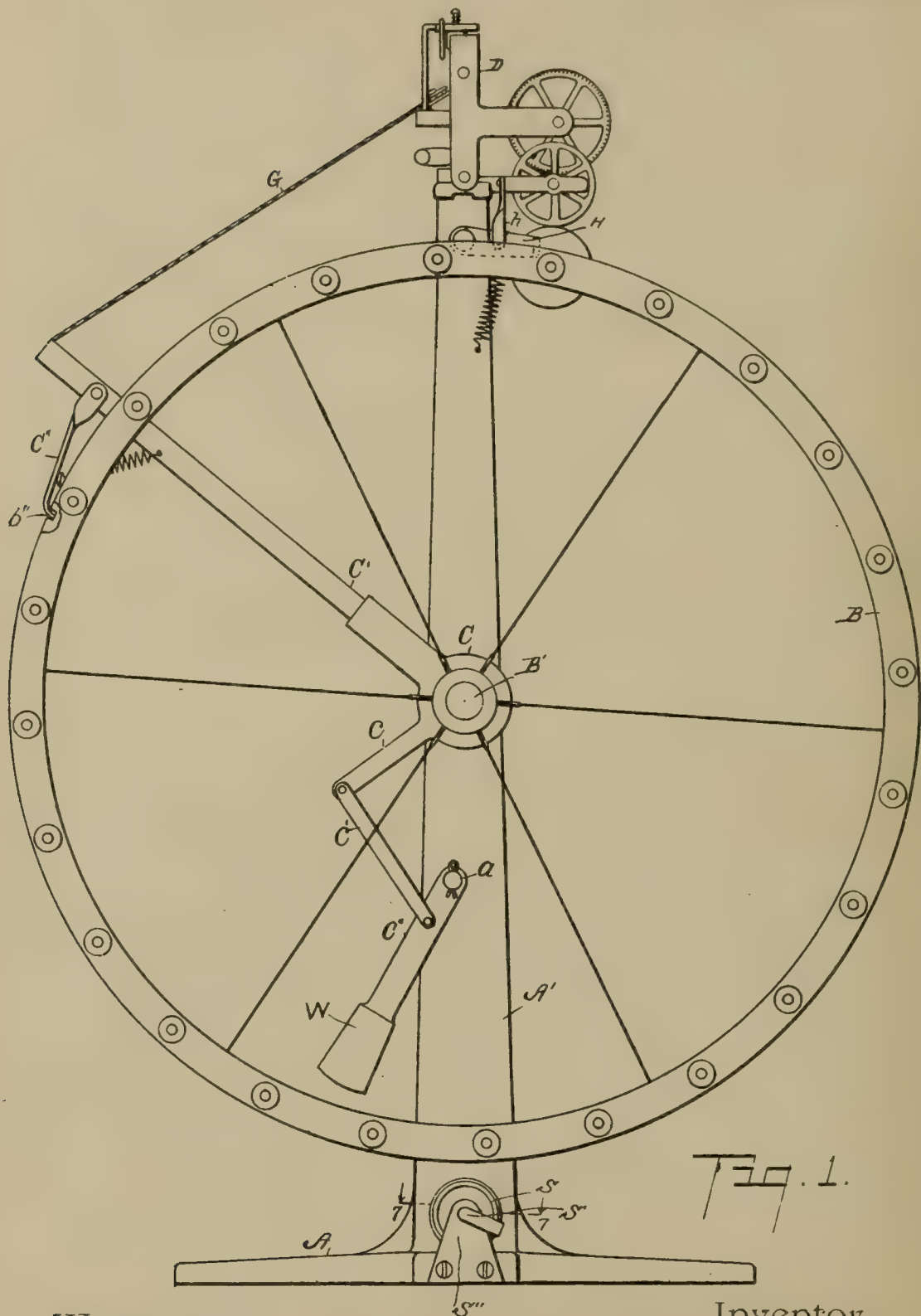


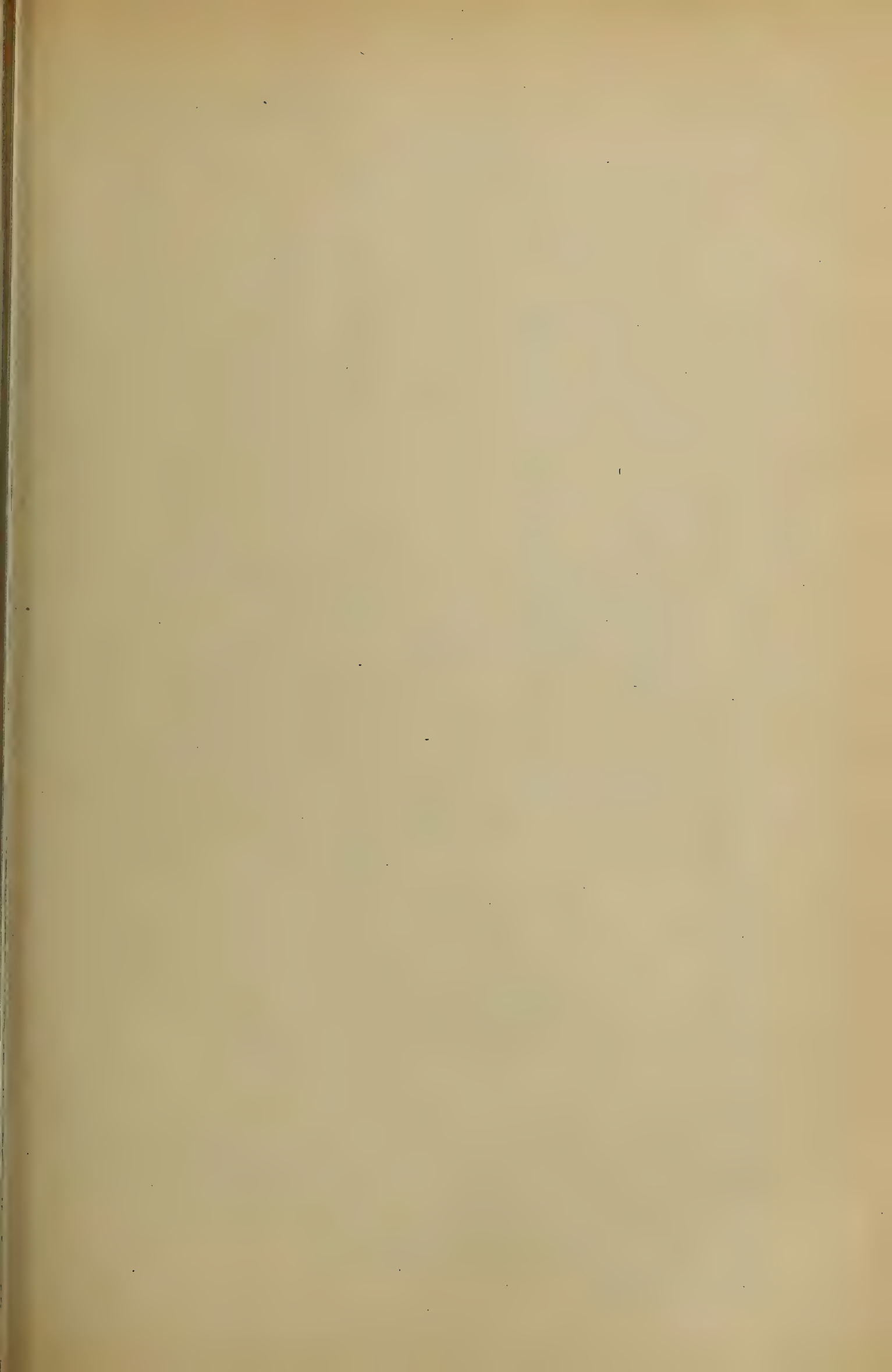
Fig. 1.

Witnesses:

Adelaide F. Adams
Estel A. Bradford

Inventor,

Cornel Ridderhof
By *Chappell & Earl*
Att'ys



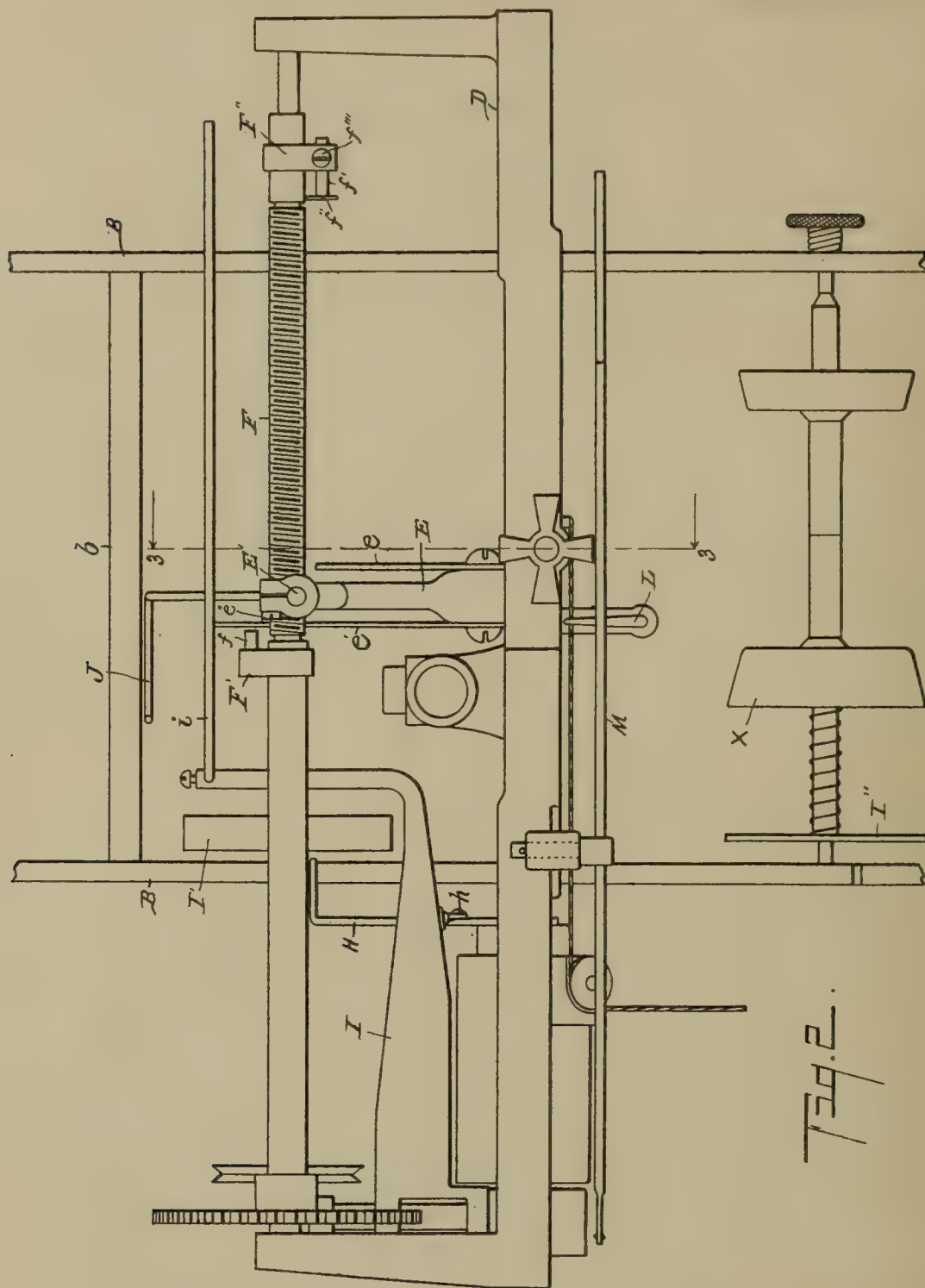
No. 848,687.

PATENTED APR. 2, 1907.

C. RIDDERHOF.
PHONOGRAPH.

APPLICATION FILED SEPT. 27, 1905.

3 SHEETS—SHEET 2.



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Witnesses:

Wm. L. Adams
Edw. A. Bradford

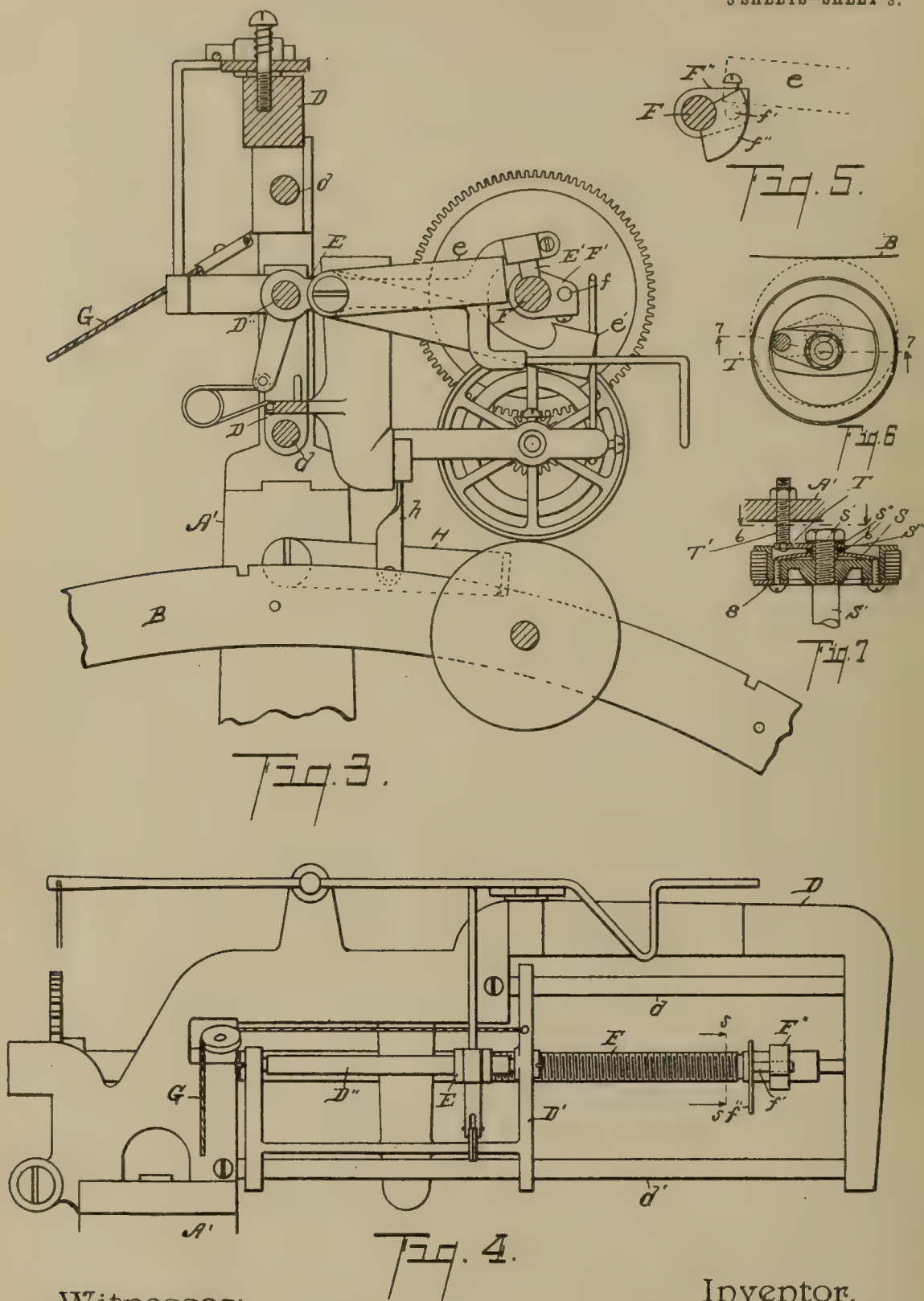
Inventor,

By *Cornel Redderhof*
Chappell & Earl
Att'ys

C. RIDDERHOF.
PHONOGRAPH.

APPLICATION FILED SEPT. 27, 1905.

3 SHEETS—SHEET 3.



Witnesses:

Walter T. Adams
Edith A. Bradford

Inventor,

Cornel Ridderhof
By *Chappell & Co.*
Att'y:

UNITED STATES PATENT OFFICE.

CORNEIL RIDDERHOF, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO MULTI-PHONOGRAPH COMPANY, OF WINONA, MINNESOTA.

PHONOGRAPH.

No. 848,687.

Specification of Letters Patent.

Patented April 2, 1907.

Application filed September 27, 1905. Serial No. 280,294.

To all whom it may concern:

Be it known that I, CORNEIL RIDDERHOF, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs.

It relates particularly to improvements in magazine-phonographs such as is illustrated and described in United States Letters Patents issued to Cyrus C. Shigley, May 5, 1903, No. 727,002, and October 25, 1904, No. 773,164, and is a modification and an improvement thereon.

The objects of this invention are, first, to provide in a magazine-phonograph an improved means for automatically bringing the records into proper position for the reproduction thereof; second, to provide in a phonograph improved means for bringing the reproducer into and out of engagement with the record-rolls.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of a structure embodying the features of my invention, a portion of the magazine-wheel being broken away to show the structural details. Fig. 2 is a plan view of the structure appearing in Fig. 1. Fig. 3 is an enlarged detail sectional view taken on a line corresponding to line 3 3 of Fig. 2. Fig. 4 is a detail rear elevation view looking from the left of Fig. 1. Fig. 5 is an enlarged detail view showing the structural details of the trip for throwing the reproducer out of engagement with the record-roll. Fig. 6 is a detail section of the magazine-shifting mechanism, taken on a line corresponding to line 6 6 of Fig. 7. Fig. 7 is a detail section taken on lines 7 7 of Figs. 1 and 6.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, A is a suitable base, and A' is a standard or upright thereon, by which the operative parts of the machine are supported. The machine is usually provided with a suitable casing, the same not being here illustrated.

The record-rolls are supported by a magazine-wheel consisting of a pair of rims B, which are rigidly secured together by suitable cross-pieces, as *b*. The wheel is mounted upon the spindle B', carried by the standard A. The record-rolls (see the dotted lines in Fig. 2) are mounted on suitable mandrels X, which are supported in suitable bearings carried on the rims. The mandrel and the arrangement of these bearings forming no part of this invention are not described in detail herein.

One of the rims B is provided on its periphery with a plurality of notches *b''*, there being one to each mandrel. A pawl C'', arranged to bear on the periphery of this rim, is pivotally mounted on the lever C'. A coiled spring *s* holds this pawl against the rim.

The lever C' is provided with a hub-like head C, which is mounted on the shaft B' of the magazine-wheel. The lever is actuated in its forward position by the weight *w*, which is carried by the arm *c''*, pivoted on a suitable stud *a* on the standard A'. The weight is connected to the lever C' by the link *c'*, which is pivoted to the short arm *c* thereof. By thus connecting the weight to the lever the power is delivered thereto, so that the magazine-wheel is advanced without the accelerated motion resulting from directly connecting the weight thereto, the magazine-wheel being advanced and stopped with a minimum shock, so that there is practically no vibration of the machine after the adjustment. This permits the arrangement of the parts so that the reproducer can be immediately thrown into engagement with the record-roll without the liability of injury thereto and without producing the disagreeable sounds that would otherwise be the result.

The magazine-wheel is held in its adjusted

position by the locking-dog H. Connections for operating this dog will be hereafter described.

The lever C' is returned to its initial position by the movement of the carriage D', by which the reproducer is carried, the reproducer not being here illustrated, its relation clearly appearing in the patents referred to. The lever C' is connected to the carriage D' by the cord G, as clearly appears from the drawings.

The carriage D' is reciprocatingly mounted on the ways *d* and *d'*, which are preferably in the form of rods and are carried by the frame D. The frame D is secured to the upper end of the standard A'. The carriage is returned to its initial position by the weight W through the connections described. A threaded driving-shaft F for the carriage is mounted in suitable bearings in the frame D. A rock-shaft D'' is carried by the carriage. On this rock-shaft is an arm E, having a blade E', adapted to engage the screw driving-shaft F, so that as the shaft is revolved the carriage is driven along thereby. The blade E' is adjustably secured in the end of the arm E, the end of the arm being split and provided with a clamping-screw *e''*. (See Fig. 2.)

As the carriage is driven along the lever C' is lifted until the pawl C'' engages in the notch of the successive record-roll, and when the carriage is released for its return to its initial position the magazine is advanced as described.

When the carriage reaches the end of its movement, the driving-blade is automatically thrown out of engagement with the shaft by means of the trip-arm F'', which is secured upon the shaft F. On this trip-arm is a laterally-projecting trip-pin *f'*. The trip-pin *f'* is adjustably secured on the arm F'' by means of a suitable set-screw *f'''*. On the inner end of this pin *f'* is a plate *f''*. This pin *f'* as the carriage reaches the end of its movement engages the trip-arm *e* on the rock-shaft, rocking the same rearwardly, thereby throwing the driving-arm E out of engagement with the shaft. This rearward movement of the rock-shaft throws the arm L, carried thereby, from under the motor-controlling lever M, allowing the same to drop, and thereby stopping the motor. This arrangement being substantially that described in the patents heretofore mentioned is not illustrated in detail herein. The plate *f''*, engaging the arm *e* of the rock-shaft after the same is thrown up by the pin *f'*, retains the carriage at the end of its movement until the driving-shaft is again started, when the carriage is released. When the carriage reaches its initial position, the arm *e'* on the rock-shaft, which extends under the driving-shaft, is engaged by the pin *f*, projecting from the arm F', carried by the driving-shaft. As

the shaft is revolved the arm *e'* is thrown downwardly, bringing the driving-arm into engagement with the shaft.

Each of the record-mandrels is provided with a thin disk-like wheel I'', which as the magazine is advanced are brought into position to be engaged by the friction-wheel I', which is carried by the pivoted frame I. The frame I is lifted to throw the wheel I' out of its engaging position by the forwardly-projecting arm J, which is preferably an extension of the driving-arm E. This arm J engages a rod *i*, carried by the pivoted frame I when the arm E is lifted.

The locking-dog H of the magazine-wheel is connected by a suitable link *h* to the frame I, so that the magazine-wheel is released when the carriage reaches the end of its movement, so that it is free to be adjusted upon the introduction of a coin, which starts the motor, and thereby the shaft.

When it is desired to reproduce some particular record other than that for which the machine would automatically adjust itself, the magazine is automatically adjusted by means of the friction-wheel S. (See Figs. 1, 6, and 7.) This wheel is secured to a shaft S', which is arranged in a suitable bearing on the standard S''. The bearing for the shaft is sufficiently large to allow the tilting of the shaft to bring the wheel S into contact with the magazine-wheel, as is indicated by dotted lines in Fig. 6. The inner end of the shaft S' is pivotally connected by the link T to the pin T', which projects from the standard A'. Friction is applied to the link to insure the lifting of the wheel S into contact with the magazine-wheel by the spring *s*. This spring is a blade-spring, slightly bowed, arranged with its ends contacting with the face of the wheel S, as clearly appears from Figs. 6 and 7. The link and spring are held upon the shaft by the nut *s'*. I preferably interpose friction-washers S'', of leather, fiber, or other suitable material, between the link and nut and the link and spring.

In order to prevent the nut clamping the link and spring too tightly, I preferably arrange a sleeve S''' upon the shaft for the nut to clamp against, the inner end of the sleeve bearing against the wheel S.

In my improvements I have materially simplified the structure of the patents referred to, making the same more economical to produce and more durable. I have illustrated and described the same in detail in the form preferred by me, although I am aware that it is capable of considerable variation in structural details without departing from my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a

locking-dog for said magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; 5 a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an 10 arm F'' on said driving-shaft, having an adjustable trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said 15 arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; 20 a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

2. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; 30 a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an 35 arm F'' on said driving-shaft, having a trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* 40 thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a 45 pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

3. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; 50 a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an 55 arm F'' on said driving-shaft, having an adjustable trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said 60 arm *e'* thereon; a pivoted lever having a pawl thereon for actuating said magazine-

wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified. 70

4. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; 75 a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an 80 arm F'' on said driving-shaft, having a trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* there- 85 on; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight- 90 carrying arm to the short arm of said lever, for the purpose specified.

5. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a 95 screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rear- 100 ward position when said carriage reaches the end of its movement; an arm F'' on said driving-shaft, having an adjustable trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an 105 arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; a piv- 110 oted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carry- 115 ing arm to the short arm of said lever, for the purpose specified.

6. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on 120 said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its 125 movement; an arm F'' on said driving-shaft, having a trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, hav- 130 ing a laterally-projecting trip-pin for said

arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

7. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having an adjustable trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

8. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having a trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; a pivoted lever having a pawl thereon for actuating said magazine-wheel; connections for said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

9. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having an adjustable trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having

a laterally-projecting trip-pin for said arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

10. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having a trip-pin for said arm *e*; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

11. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having an adjustable trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

12. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; connections for said rock-shaft to said motor for stopping it; a driving-arm *E* on said rock-shaft; a shaft-engaging blade *E'* secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm *F''* on said driving-shaft, having a trip-pin for said arm *e*; said trip-pin being adapted to engage said arm to retain the carriage until the starting of the motor; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm *F'* on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* there-

on; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

13. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm F'' on said driving-shaft, having an adjustable trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; connections for said rock-shaft to said locking-dog for said magazine-wheel; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

14. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm F'' on said driving-shaft, having a trip-pin for said arm *e*; said trip-pin being adapted to engage said arm to retain said carriage; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

15. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm F'' on said driving-shaft, having an adjustable trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

16. In a magazine-phonograph, the com-

bination of a frame; a magazine-wheel; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm E on said rock-shaft; a shaft-engaging blade E' secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm F'' on said driving-shaft, having a trip-pin for said arm *e*, said trip-pin being adapted to engage said arm to retain the carriage until the starting of the motor; an arm *e'* on said rock-shaft for throwing it to its forward position; an arm F' on said screw-shaft, having a laterally-projecting trip-pin for said arm *e'* thereon; means for actuating said magazine-wheel; and connections for said wheel-actuating means to said carriage, for the purpose specified.

17. In a phonograph, the combination of a frame; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm on said rock-shaft; a shaft-engaging blade adjustably secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm on said driving-shaft, having an adjustable trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; and means for throwing said rock-shaft forwardly when said carriage is returned to its initial position, for the purpose specified.

18. In a phonograph, the combination of a frame; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm on said rock-shaft; a shaft-engaging blade secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm on said driving-shaft, having a trip-pin for said arm *e*, said pin having a retaining-plate for said arm thereon; and means for throwing said rock-shaft forwardly when said carriage is returned to its initial position, for the purpose specified.

19. In a phonograph, the combination of a frame; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm on said rock-shaft; a shaft-engaging blade adjustably secured to said driving-arm; an arm *e* on said rock-shaft for throwing it to its rearward position when said carriage reaches the end of its movement; an arm on said driving-shaft, having an adjustable trip-pin for said arm *e*; and means for throwing said rock-shaft forwardly when said carriage is returned to its initial position, for the purpose specified.

20. In a magazine-phonograph, the combination of a frame; a screw driving-shaft; a carriage; a rock-shaft on said carriage; a driving-arm on said rock-shaft; a shaft-engaging blade adjustably secured to said driving-arm; an arm on said rock-shaft for throwing it to its forward position; and an arm on

said screw-shaft, having a laterally-projecting trip-pin for said arm thereon, for the purpose specified.

21. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a locking-dog for said magazine-wheel; a motor; a screw driving-shaft; a carriage; a rock-shaft on said carriage; an arm on said rock-shaft arranged to engage said driving-shaft; connections for said rock-shaft to said motor for stopping it; means for actuating said rock-shaft at the ends of the movement of the said carriage; connections for said rock-shaft to said locking-dog for said magazine-wheel; a pivoted lever having a pawl thereon for actuating said magazine; connections from said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

22. In a magazine-phonograph, the combination of a frame; a magazine-wheel; a carriage; driving means therefor; a pivoted lever having a pawl thereon for actuating said magazine; connections from said lever to said carriage; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

23. In a magazine-phonograph, the combination of a frame; a magazine-wheel; driving means therefor; a pivoted lever having a pawl thereon for actuating said magazine; a weight; a pivoted arm by which said weight is carried; and a connecting-link for said weight-carrying arm to the short arm of said lever, for the purpose specified.

24. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; a bowed spring arranged to bear against said wheel; a sleeve on said shaft; a nut clamped against said sleeve; and friction-washers arranged between said nut and link and said link and spring, for the purpose specified.

25. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; a bowed spring arranged to bear against said wheel; and friction-washers arranged between said nut and link and said link and spring, for the purpose specified.

26. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; a bowed spring arranged to bear against said wheel; a sleeve on said shaft; and a nut clamped against said sleeve, for the purpose specified.

27. In a magazine phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; and a bowed spring arranged to bear against said wheel, for the purpose specified.

28. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; a bowed spring arranged between said wheel and link; a sleeve on said shaft; and a nut clamped against said sleeve for securing said wheel and link in position; for the purpose specified.

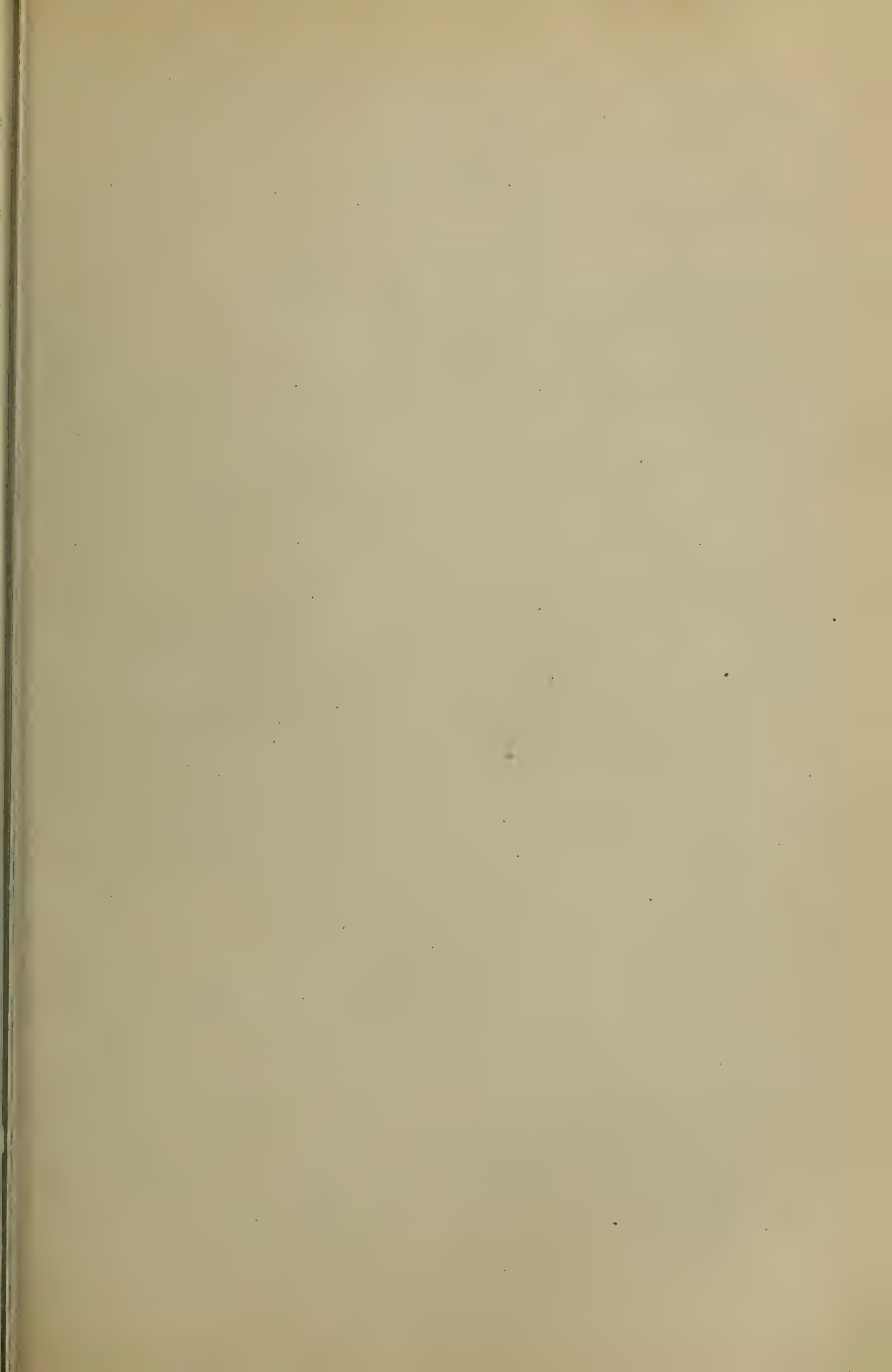
29. In a magazine-phonograph, the combination of a magazine-wheel; a pivotally-supported shaft; a driving-wheel for said magazine-wheel on said shaft; a pivotally-supported link on said shaft; and a bowed spring arranged between said wheel and link, for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

CORNEIL RIDDERHOF. [L. s.]

Witnesses:

CHAS. E. MEECH,
MARGARET VAN SPYKER.



W. W. ROSENFELD.
PHONOGRAPH.
APPLICATION FILED MAY 16, 1906.

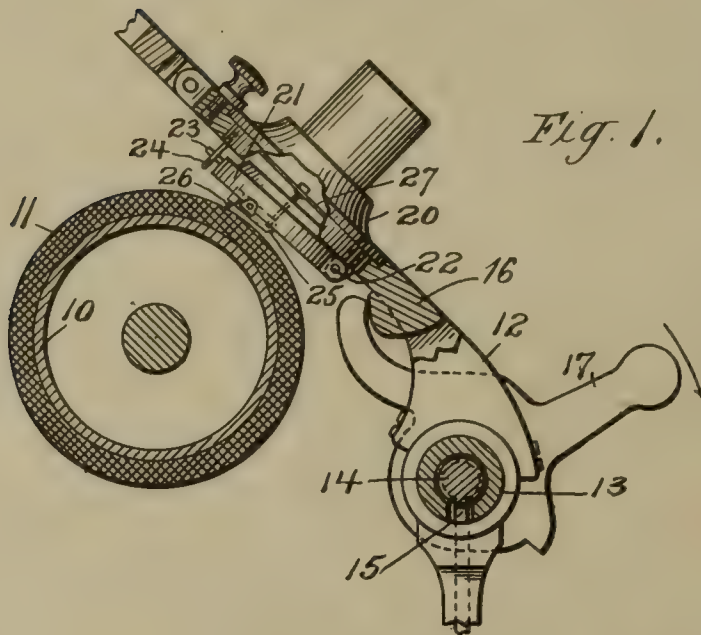


Fig. 1.

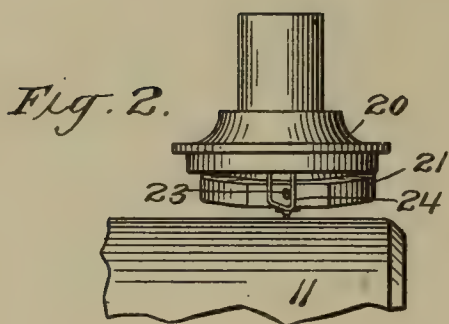


Fig. 2.

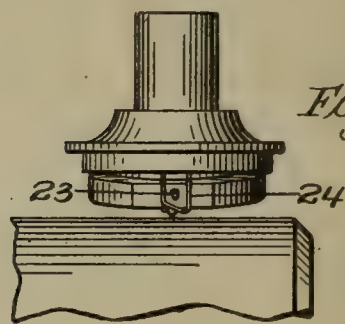


Fig. 3.

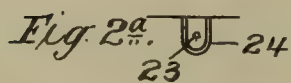


Fig. 2^a.

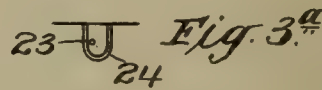


Fig. 3^a.

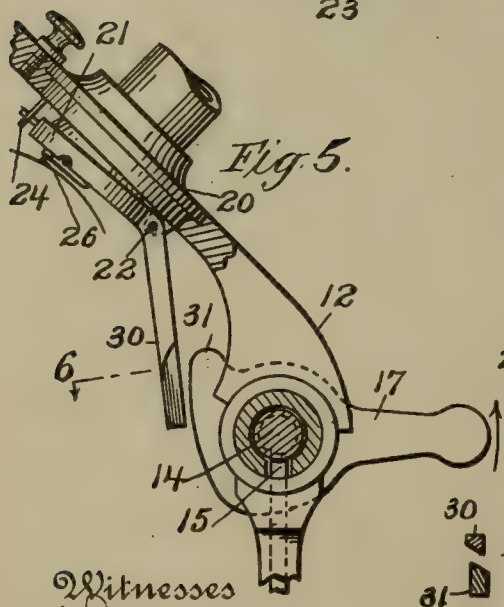


Fig. 5.

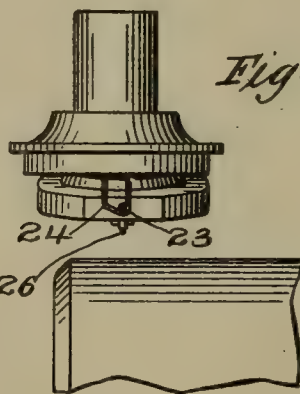


Fig. 4.

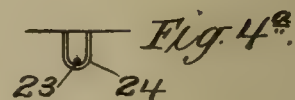


Fig. 4^a.

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Inventor
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By his Attorneys.
Philip Sanger Rice Kemmer

UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 849,086.

Specification of Letters Patent.

Patented April 2, 1907.

Application filed May 16, 1906. Serial No. 317,065.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Phonographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in phonograph-reproducers.

In phonographs in which the reproducing-point is moved laterally of the record by means of a feed-screw or other means other than the record-groove itself, as in the common type of cylinder-machines, more or less difficulty has been encountered heretofore by reason of the existence of more or less lost motion in the driving means or connections by which the reproducer is given its movement laterally of the record-groove or longitudinally of the record-mandrel. In such machines the connection between the reproducing-point and the diaphragm of the reproducer is usually such as to permit some lateral movement of the reproducing-point independently of and relatively to the diaphragm, so that the reproducing-point may automatically adjust its position with relation to the record-groove, and in order to avoid any difficulty due to irregularity of the record-surface the reproducing-point in a well-known type of reproducers is carried by a lever connected with the diaphragm and pivotally mounted on a weighted or spring-pressed member or device which is capable of moving toward and from the diaphragm and acts as a retarding device, the inertia of which will not be overcome by quick vibrations corresponding to the sound-waves to be reproduced, but which will be moved by and take up the slower movements of the reproducing-point due to irregularities in the record-surface. Such retarding device is also usually mounted so as to be capable of some lateral movement relatively to the diaphragm, being usually pivoted at one side of the diaphragm and its lateral movement, which is then a swinging movement about its pivot, limited by means of a pin extending into a loop at the other side of the diaphragm, which loop also forms a supporting means for the retarding device when the reproducer is moved to carry the reproducing-point off the record. By reason of the lost motion above referred to in the means for feeding the

reproducer over the record in starting the machine after the reproducing-point has been brought into engagement with the record the rotation of the record-cylinder will cause the reproducing-point to be moved forward somewhat before the forward movement of the carrier begins, and in making such independent lateral movement the reproducing-point will cause a corresponding movement of the retarding device relatively to the diaphragm. Such independent lateral movement of the reproducing-point and of the retarding device will be more or less according to the amount of lost motion in the reproducing-driving means and according to the position of the driving devices and connections before starting and will always be a relatively small amount; but any such movement whereby the reproducing-point is moved out of its normal position relatively to the diaphragm is undesirable, and frequently such movement will be sufficient to cause the pin on the retarding device to come into engagement with the side of the supporting-loop, thus interfering with the free movement of the retarding device.

The object of the present invention is to avoid the above difficulty due to lateral movement of the reproducing-point and of the retarding device relatively to the diaphragm in starting, and this difficulty is avoided in accordance with the invention by providing means whereby the reproducing-point and retarding device, when such device is used, is shifted slightly backward relatively to the diaphragm when the reproducing-point is off the record, so that when the reproducing-point is brought into engagement with the record while in this slightly-shifted position the preliminary independent movement of the reproducing-point above referred to will merely result in moving it back to its normal position relatively to the diaphragm. For this purpose, in the construction above referred to, in which a pivoted retarding device is employed which is supported at one side of the diaphragm by means of a pin extending into a loop or other means for limiting the lateral swinging movement of the retarding device and for supporting the same when the reproducing-point is off the record, the supporting portion of the loop is inclined, so that when the retarding device is supported thereby it will be thrown slightly backward from its normal position.

A full understanding of the invention can

best be given by a detailed description of a preferred construction embodying the same, and such a description will now be given in connection with the accompanying drawings, in which—

Figure 1 is a sectional view through the record-mandrel and feed-shaft of a well-known form of phonograph and showing the reproducer-carrier with a reproducer in position, the reproducer being partly broken away. Fig. 2 is a view of the reproducer and a portion of the record-cylinder looking in the direction of the arrow 2 of Fig. 1. Figs. 3 and 4 are views similar to Fig. 2, showing the reproducer in different positions. Figs. 2^a, 3^a, and 4^a are detail views corresponding to Figs. 2, 3, and 4 and illustrating a construction not embodying the present invention. Fig. 5 is a side view, partly in section, showing an application of the invention to a slightly-different form of phonograph from that shown in Fig. 1. Fig. 6 is a detail section on line 6 of Fig. 5.

Referring to the drawings, and first to Figs. 1 to 4^a, 10 represents the cylindrical mandrel for carrying a record-cylinder 11. 12 represents the reproducer-carrier, such carrier being mounted on a sleeve 13, along which it is moved during the reproducing operation by means of the usual feed-screw 14, the feed-screw being engaged by a feed-nut 15 when the reproducer is in position to bring the reproducing-point into engagement with the record. The reproducer is carried by a pivoted holder 16, which may be raised to lift the reproducer away from the record by a handle 17, mounted to turn on the sleeve 13. It will be understood that the feed-shaft and the mandrel are rotated together by suitable connections from a common motor or other source of power, as usual. The reproducer 20 is of a well-known form, having a retarding device in the form of a floating weight 21, pivoted at 22 to the rim of the reproducer, so as to be movable flatwise toward and from the diaphragm and the record and also capable of a lateral movement transversely of the spiral record-groove. A pin 23 extends from the opposite edge of the floating weight into a loop or staple 24, extending from the rim of the reproducer, such pin and loop or staple acting to limit the lateral movement of the weight and to support the same when the reproducer is lifted to carry the reproducing-point off the record. Pivottally mounted on the floating weight is a lever 25, one end of which carries the reproducing-point 26 and the other end of which is connected by a link to the diaphragm 27.

As so far described the construction is of a well-known form. As heretofore constructed the supporting-loop 24 has been formed so that when the reproducer is raised to lift the reproducing-point off the record the floating weight will be supported in its normal posi-

tion laterally with relation to the diaphragm, the loop being located so that when the weight is in such central position the pin 23 will lie about midway between the sides of the loop, and the supporting end of the loop being symmetrically rounded, so that when the reproducer is raised the pin 23 will come to rest in its central position relatively to the sides of the loop, as shown in Fig. 4^a, thus holding the floating weight in its normal central position relatively to the diaphragm. With this construction when the reproducer is lowered to operative position the floating weight will be supported by the reproducing-point and the pin 23 will take the position relatively to the loop shown in Fig. 2^a, and when the machine is started the feeding movement of the carrier 12 will usually not commence until after the record-mandrel begins its rotation, for the reason hereinbefore pointed out, with the result that the reproducing-point, and consequently the floating weight 21, will be given a slight lateral movement relatively to the diaphragm before the feeding movement of the reproducer begins. Such relative movement will cause the pin 23 to move out of its central position in the loop 24, and such movement will often be sufficient to cause the pin to come into engagement with the side of the loop, as shown in Fig. 3^a. The floating weight and the reproducer and its connection with the diaphragm will thus be thrown out of their normal central position, and the engagement of the pin 23 with the side of the loop 24 will interfere with the free movement of the floating weight. To avoid such difficulty by the application of the present invention to the construction shown, the supporting portion of the loop 24 is inclined, so that when the reproducer is raised to lift the reproducing-point off the record the pin 23 will slide on the inclined portion of the loop to the position shown in Fig. 4, thus shifting the floating weight and the reproducing-point slightly backward relatively to the diaphragm. The parts will then be supported in this position until the reproducer is again lowered to bring the reproducing-point into engagement with the record, and when thus returned to operative position the floating weight and reproducing-point will retain such shifted position relatively to the diaphragm, as shown in Fig. 2, with the result that when the machine is started and the record-mandrel begins to rotate before the commencement of the feeding movement of the reproducer-carrier the resulting movement of the floating weight and the reproducing-point relatively to the diaphragm will result merely in returning these parts to their normal operative position centrally with relation to the diaphragm.

Fig. 5 shows an application of the invention to a construction similar to but slightly modified from that shown in Fig. 1. As

shown in this figure, the reproducer is set directly in the upwardly-extending portion of the carrier 12, the pivoted holder 16 (shown in Fig. 1) being omitted, and the reproducing-point is raised from the record by swinging the floating weight 21 away from the record in place of moving the whole reproducer bodily away from the record. For effecting such movement of the floating weight the floating weight is provided with a downwardly-extending arm 30, in position to be engaged by the upwardly-extending arm or cam projection 31 of the hand-lever 17, the hand-lever being moved upward in this construction for raising the reproducing-point from the record and disconnecting the feed-nut from the feed-screw instead of being moved downwardly for this purpose, as in Fig. 1. For giving the backward shift to the floating weight and reproducing-point when the weight is lifted to carry the reproducing-point off the record the parts 30 and 31 are formed with beveled or inclined engaging faces, as shown by the detailed section in Fig. 6. With these parts so formed, when the hand-lever 17 is raised the engagement of the arm 31 with the arm 30 will not only cause the floating weight 21 to be lifted away from the record, but will also cause it to be shifted slightly backward relatively to the diaphragm, in which position it will then be supported until the hand-lever is moved in the opposite direction to release the floating weight and permit the reproducing-point to again come into engagement with the record. The same result is thus secured as is secured through the action of the loop with the inclined supporting portion, as shown in Figs. 2, 3, and 4. The form of the lower or supporting portion of the loop 24 in the construction shown in Fig. 5 is immaterial, as the loop acts in this construction merely to limit the lateral movement of the floating weight and to support the floating weight when the reproducer is removed from the carrier.

It will be understood that the term "phonograph" is used herein as a broad term to include all sound recording and reproducing machines to which the invention is or may be found applicable.

What is claimed is—

1. In a phonograph, the combination with the record - carrier, the reproducer - carrier, and a feed-screw and a feed-nut for coaxing to give the reproducer-carrier its reproducing movement, of a reproducing-diaphragm, a reproducing-point connected therewith and capable of movement independently thereof laterally of the record, and means for shifting the reproducing-point slightly backward relatively to the diaphragm when off the record, substantially as described.

2. In a phonograph, the combination with the reproducing-diaphragm, of a reproducing-

point connected therewith and capable of movement independently thereof laterally of the record, and means for shifting the reproducing-point slightly backward relatively to the diaphragm when moved off the record and for holding it in such position until again moved into engagement with the record, substantially as described.

3. In a phonograph-reproducer, the combination with the diaphragm, of a reproducing-point connected therewith and capable of movement independently thereof laterally of the record, and means for shifting the reproducing-point slightly backward relatively to the diaphragm when off the record, substantially as described.

4. In a phonograph-reproducer, the combination with the diaphragm, of a reproducing-point connected therewith and capable of movement independently thereof laterally of the record, and means for supporting the reproducing-point when off the record in a position slightly backward of its normal reproducing position, substantially as described.

5. In a phonograph, the combination with a record-mandrel for carrying a cylindrical record, a reproducer-carrier, and a feed-screw for engaging a feed-nut on the carrier for giving the carrier its reproducing movement, of a reproducer having a reproducing-point connected with the diaphragm so as to be capable of movement independently thereof laterally of the record, and means for shifting the reproducing-point slightly backward relatively to the diaphragm when off the record, substantially as described.

6. In a phonograph, the combination with a reproducing-diaphragm, of a member capable of movement toward and from the diaphragm and tending to move from the diaphragm toward the record and also capable of movement independently of the diaphragm laterally of the record, a reproducing-point supported by said member and connected with the diaphragm, and means for shifting said member slightly backward relatively to the diaphragm when moved to carry the reproducing-point off the record, substantially as described.

7. In a phonograph-reproducer, the combination with the diaphragm, of a member capable of movement toward and from the diaphragm and tending to move from the diaphragm toward the record and also capable of movement independently of the diaphragm laterally of the record, a reproducing-point supported by said member and connected with the diaphragm, and means for shifting said member slightly backward relatively to the diaphragm when the reproducer is moved out of operative position, substantially as described.

8. In a phonograph-reproducer, the combination with the diaphragm, of a member capable of movement toward and from the

diaphragm and tending to move from the diaphragm toward the record and also capable of movement independently of the diaphragm laterally of the record, a reproducing-point supported by said member and connected with the diaphragm, and an inclined support for said member for shifting said member slightly backward relatively to the diaphragm when moved to carry the reproducing-point off the record, substantially as described.

9. In a phonograph-reproducer, the combination with the diaphragm, of a member pivoted to swing toward and from the diaphragm and also laterally of the record and tending to move from the diaphragm toward

the record, a lever pivotally mounted on said member and connected with the diaphragm, a reproducing-point carried by said lever, and a supporting-loop for said member having an inclined supporting portion for shifting said member slightly backward relatively to the diaphragm when the reproducer is moved out of operative position; substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM W. ROSENFELD.

Witnesses:

HENRY D. GOBBER,
PHILIP N. TILDEN.

No. 849,404.

PATENTED APR. 9, 1907.

H. KOCH.
MANDREL FOR TALKING MACHINES.
APPLICATION FILED APR. 23, 1906.

Fig. 1.

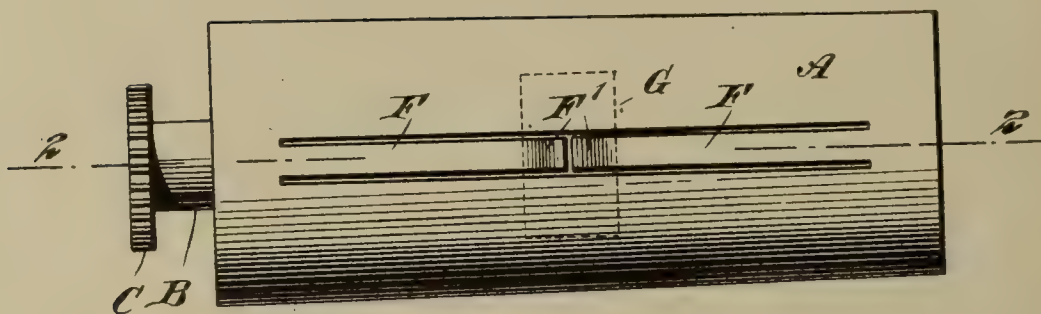
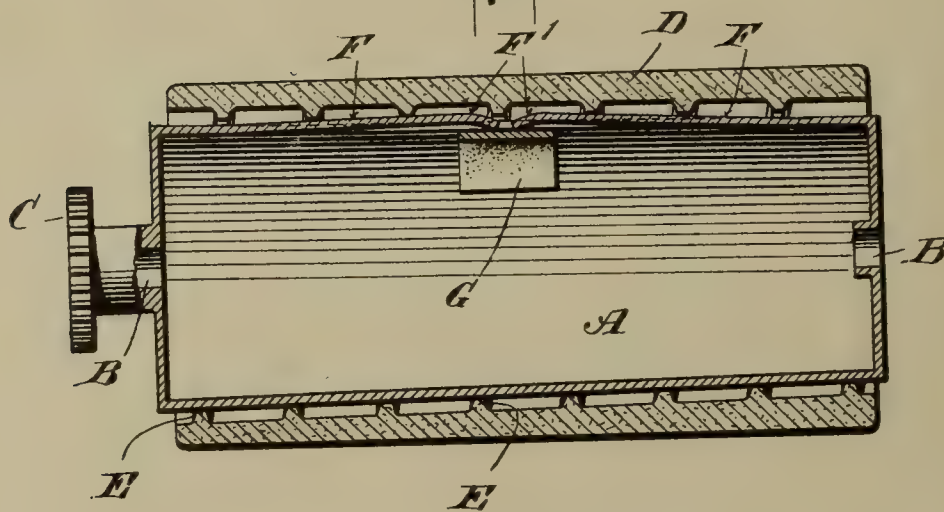


Fig. 2.



WITNESSES
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John Lotka

INVENTOR
Henry Koch
BY
Briese & Thacker
ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY KOCH, OF RAHWAY, NEW JERSEY, ASSIGNOR TO THE REGINA COMPANY, OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MANDREL FOR TALKING-MACHINES.

No. 849,404.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed April 23, 1906. Serial No. 313,107.

To all whom it may concern:

Be it known that I, HENRY KOCH, a citizen of the United States, and a resident of Rahway, Union county, State of New Jersey, have invented certain new and useful Improvements in Mandrels for Talking-Machines, of which the following is a specification.

My invention relates to mandrels for supporting cylindrical talking-machine records, and has for its object to provide such mandrels with means for preventing the cracking or destruction of such records when they are left in position on said mandrels for any length of time.

My invention will be fully described hereinafter, and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is an outside view of my improved mandrel; and Fig. 2 is a section thereof on line 2 2 of Fig. 1, showing the record in position.

The hollow body A of the mandrel is conical in shape and is provided with the usual end openings B, through which the customary supporting-axle is adapted to pass, which axle may be supported in any convenient manner. A gear C is secured to or forms part of the mandrel and is adapted to mesh with a driving gear-wheel, through the medium of which the mandrel is rotated. The driving mechanism may be of any approved construction and forms no part of my present invention, so that I have not deemed it necessary to show said mechanism.

D is the cylindrical record, which may be provided on its inner surface with spiral projection E, adapted to engage the outer surface of the mandrel. In many cases it becomes necessary to leave the said records in position on the mandrel, and the contraction of the material of which the records are made, due to atmospheric changes, thus often causes said records to crack. In other instances the metal of which the mandrel is constructed will expand and produce the same result. To overcome these objections,

I have provided the body of the mandrel with two resilient members F, the ends of which are slightly curved at F'. A pad of felt or like material G is provided in the inner surface of the mandrel adjacent to the ends F' of the members F. This pad G prevents said ends F' from being forced too far inwardly and at the same time tends to press said ends F' outward against the inner surface of the record, thus aiding in maintaining the natural resiliency of the arms F.

It will be readily seen from the above description that as the record contracts the arms F will yield, and thus prevent any strain on said record. This is also true if the mandrel expands from changes in temperature. If, on the other hand, the record expands, the arms F will follow along and serve to act as a locking means, and thus prevent the record from slipping off the mandrel and also insure its proper rotation when the machine is operated. The same remarks of course apply if the mandrel shrinks or contracts. Any slight variation in the inside diameter of different records will thus also be rendered of no consequence, and machines equipped with my improved mandrel will accommodate records of varying sizes and insure the perfect operation of all of them. The arms F also act as a key or spline and prevent the slipping of the record as the mandrel is rotated. In other words, the record when in position on the mandrel is incapable of rotation relatively to the mandrel.

With my improved construction the mandrel might be cylindrical instead of conical, and the inner diameter of the records might also be uniform throughout, thus making the parts more easy to manufacture than otherwise.

Various modifications may be made without departing from the nature of my invention as defined in the appended claims.

I claim—

1. A talking-machine mandrel provided with two yielding members extending toward each other with their ends adjacent for maintaining the record in position.

2. A talking-machine mandrel provided with a plurality of yielding members extending lengthwise of the mandrel with their free ends adjacent to each other for maintaining
5 the record in position.

3. A talking-machine mandrel provided with a yielding member projected from the curved surface of the mandrel for maintaining the record in position and means adja-

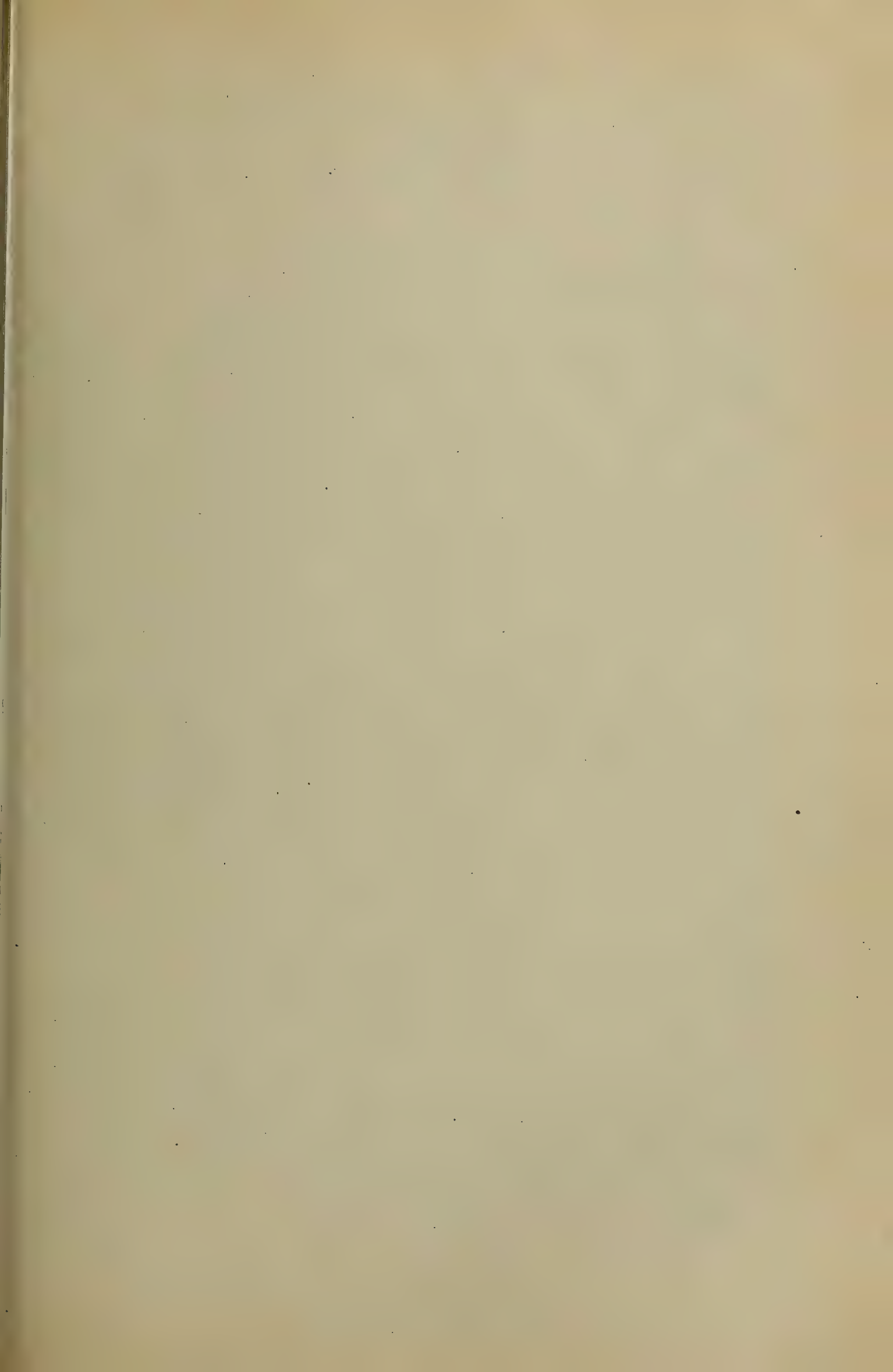
cent to the free end of the member for limiting the inward movement thereof.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY KOCH.

Witnesses:

T. J. MACDONALD,
JAS. D. LUTHER.



F. PETMECKY.
NEEDLE FOR GRAPHOPHONES AND THE LIKE.
APPLICATION FILED JAN. 10, 1906.

FIG. 1.

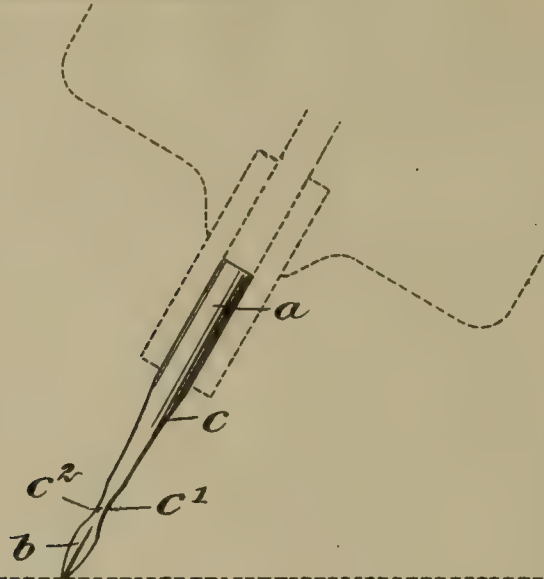
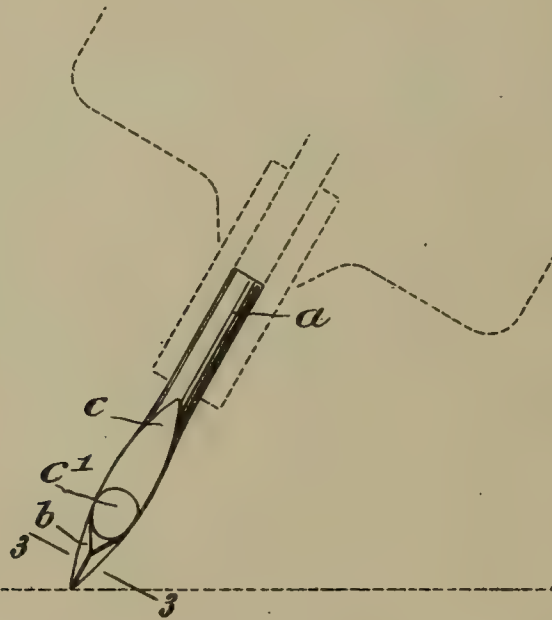
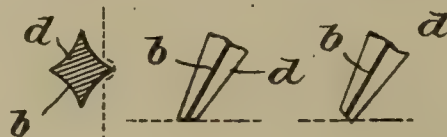


FIG. 2.



WITNESSES: FIG. 3, FIG. 4, FIG. 5,

Edw. Thorpe.
A. E. Fay.



INVENTOR

Fred Petmecky
BY Munn & Co
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRED PETMECKY, OF AUSTIN, TEXAS, ASSIGNOR TO H. F. THOMPSON, OF
NEW YORK, N. Y.

NEEDLE FOR GRAPHOPHONES AND THE LIKE.

No. 849,425.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed January 10, 1906. Serial No. 295,380.

to all whom it may concern:

Be it known that I, FRED PETMECKY, a citizen of the United States, and a resident of Austin, in the county of Travis and State of Texas, have invented a new and Improved Needle for Graphophones and the Like, of which the following is a full, clear, and exact description.

My invention relates to improvements in needles or styluses for graphophones and machines of that character, the principal objects being to provide for modifying the tone produced and to provide for increasing the durability of the needle. The first of these objects I attain by modifying the form of the body of the needle in such a manner as to permit vibrations in a certain manner, and the latter I provide for by producing a point of a new form, which when used on one side will cause a sharpened point to appear on the other, thus permitting the needle to be reversed after each operation and leaving a sharpened point ready for the next operation.

When using needles of an oval cross-section on disk-machines, the surface which comes in contact with the record is worn off in a short time and a new needle has to be substituted for practically every record which is to be operated upon. If the expedient of turning the needle over is employed, it is found that the wear of the record on the point has produced burs upon the other side, which prevent its being used in that manner. Needles are also usually made with a practically uniform cross-section from the shank to the point. This does not permit sufficient vibration. In order to produce a fine tone, I have discovered that it is desirable to reduce the cross-section of the needle in a position just above the point, so that while the point itself is rigid it is supported by a flexible section of the shank, and consequently it is capable of a certain degree of motion.

While I am aware that a flattened shank has been employed for an unknown purpose, I believe that I am the first to produce a needle or stylus of this character having a flattened portion located in exactly this position.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference

indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a stylus constructed in accordance with the principle of my invention, showing how it is used to produce a loud tone. Fig. 2 is a similar view showing how the needle is used to produce a soft tone. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is an elevation of the needle as it appears after the point is worn by use. Fig. 5 is a similar view showing the needle when reversed and ready to commence operations again.

My needle is provided with a shank *a* of the usual character and with a point *b*. Between these portions and extending from the rear end of the point to a place on the shank which is below that at which the shank is secured in the holder is a flattened section *c*. This section is not thin enough to have any material effect upon the vibration of the point, and at the lower end of the flattened portion *c* are a pair of concave surfaces *c'* on the two sides of the needle, which include between them a thin section *c''*, that permits vibrations of the point itself. The purpose of this feature will be well understood by those familiar with musical instruments. It is of course understood that the needle conducts the vibrations to the sound-diaphragm or to the box, and being thinned just at this point as low as possible on the needle without reducing the thickness of the point itself a finer tone is imparted when musical compositions are played upon the instrument. The tone is also modified by the position of the flattened surface. When the flattened surface is placed toward the record, it gives a loud tone, while with the edge toward the record a soft tone is produced. At angles between these two extremes it gives tones of intermediate quality.

In order to provide the self-sharpening feature which I have mentioned above, I make the point of the needle in the general shape of a pyramid with concave sides *d*. It will be seen by reference to Figs. 3, 4, and 5 that when the needle is drawn along the record with one of the edges in the groove the wearing of the needle at its point, as shown in Fig. 4, will merely produce a sharpened point on the opposite side, so that when the needle is turned around one hundred and eighty degrees, as is shown in Fig. 5, the point will be

ready for action. Any burs produced will be formed on the inside of the concave portions and will not interfere with the use of the needle in conducting sound. Furthermore, the needle can be used for a large number of operations, reversing it each time without injuring the record. This greatly increases the durability of both the needle and the record.

10 While I have shown the needle-point as provided with concave surfaces, it is to be understood that the principle of my invention is capable of being carried out with flat surfaces provided the needle is turned one
15 hundred and eighty degrees each time it is changed; but when it is desired to change the tone, as has been explained above, the needle may be turned only quarter of a turn or may be placed at some other angle to the original
20 position, and when this is done the concave surfaces are necessary in order to provide for turning the burs formed away from the record.

Having thus described my invention, I claim—

1. A needle of the character described having a thin portion extending along the body thereof above the point, and a flat flexible portion at the base of said thin portion and at the head of said point, the point having a
30 general pyramidal shape.

2. A needle or stylus for graphophones and the like, having a thin flat flexible portion located immediately at the rear of the point of the needle, the point having a general py-
35 ramidal shape with concave sides.

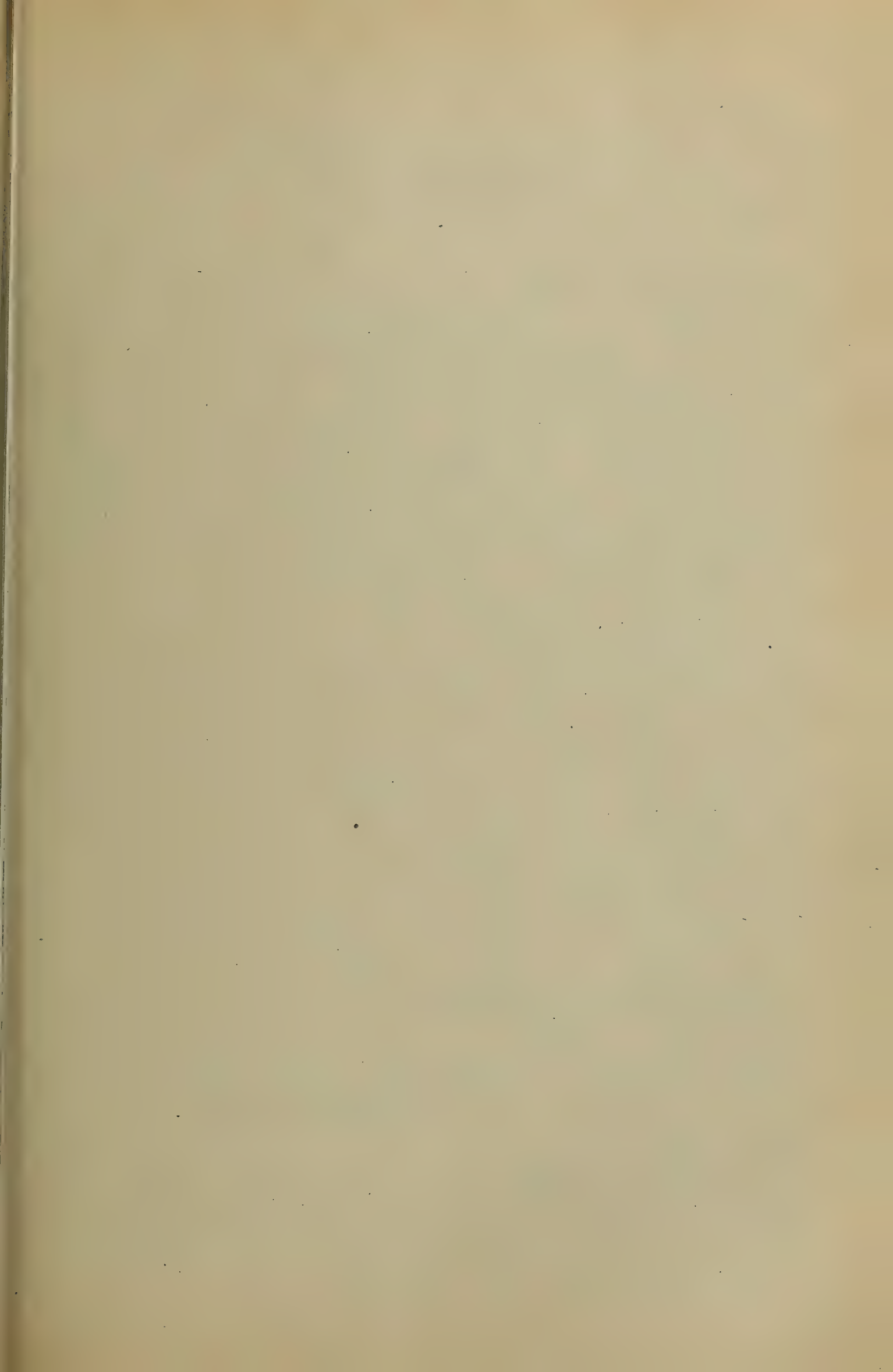
3. A needle or stylus for graphophones and the like having a pyramidal-shaped point with concave faces.

In testimony whereof I have signed my
40 name to this specification in the presence of two subscribing witnesses.

FRED PETMECKY.

Witnesses:

J. W. CHENNEVILLE,
A. GRAVES.



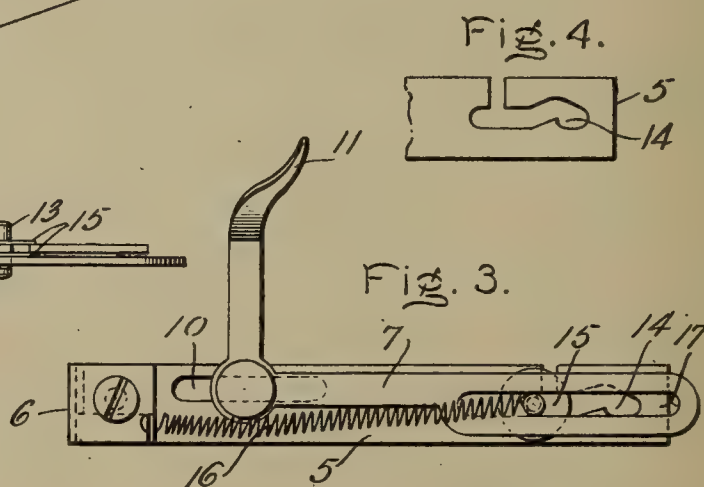
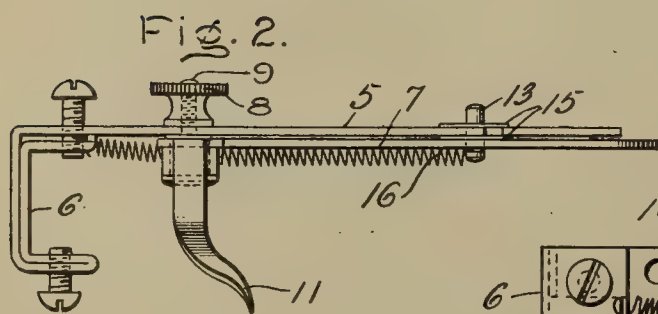
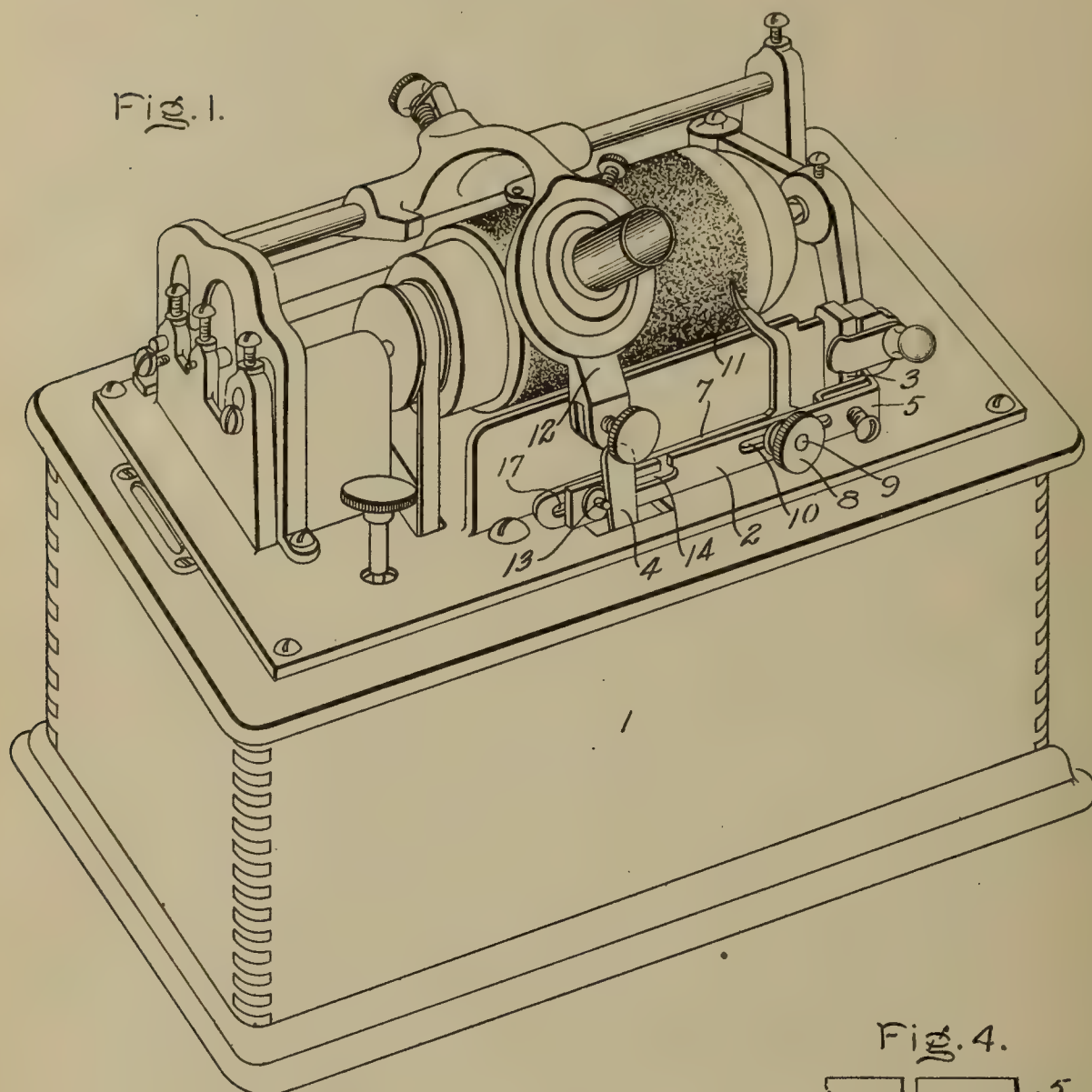
No. 849,852.

PATENTED APR. 9, 1907.

C. OTZEN.

STOP MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED DEC. 27, 1904.



WITNESSES:

George A. Thorntar.
George H. Tilden.

INVENTOR:

Charles Otzen
By *Edward Williams, Jr.*
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES OTZEN, OF SCHENECTADY, NEW YORK.

STOP MECHANISM FOR PHONOGRAPHS.

No. 849,852.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed December 27, 1904. Serial No. 238,277.

To all whom it may concern:

Be it known that I, CHARLES OTZEN, a subject of the King of Denmark, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Stop Mechanism for Phonographs, of which the following is a specification.

My invention relates to an automatic stop mechanism for phonographs whereby the motor is brought to a state of rest at a predetermined point of travel of the reproducer.

By the use of my stop mechanism the relative movement between the reproducer and record may be arrested automatically and without thought upon the part of the operator before the end of the record is reached, thereby preventing unnecessary unwinding of the motor-spring and the reproducer from riding off of the record onto the cylinder-drum and causing injury to the stylus of the reproducer.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a perspective view of a phonograph to which is attached an automatic stop mechanism. Fig. 2 is a plan view of the stop mechanism. Fig. 3 is a rear elevation of the same, and Fig. 4 is a partial rear detail of the stop-mechanism carrier or support, showing the shouldered slot which receives the starting-lever button.

Referring to the drawings, 1 represents a phonograph of any well-known construction, having a stop mechanism 2, which is secured to the phonograph at 3 and adapted to automatically move the motor-starting lever 4 to its stop position at any predetermined point of travel of the reproducer.

The stop mechanism comprises a carrier or support 5, one end of which is turned back upon itself to form a U-shaped clamping portion 6, arranged to be clamped to the phonograph-frame by means of screws. Pivottally mounted on the carrier 5 is a lever 7. This lever is secured to the carrier by means of a thumb-nut 8 and is adjustable in a horizontal direction thereon, due to the fact that its pivot-screw 9 is slidable in the slot 10 of the carrier 5. Formed integral with the lever 7 is an abutment or indicator 11, which may be set to any position with respect to the cylinder or record where it is desired to stop the operation of the phonograph, and for this purpose it extends toward the cylinder to a point where it is adapted to be struck by the

reproducer-frame 12 and thereby raise the free end of the lever and actuate the mechanism. An actuator 13 for the starting-lever is mounted in the shouldered slot 14, the same being preferably a pin provided with two collars 15 for preventing lateral movement thereof in the slot. Connected to the actuator 13 is a retractile spring 16, whose other end is secured to the carrier. This spring is used for moving the motor-starting lever 4 to its stop position through the actuator 13, which latter is moved out of engagement with the shoulder of the slot 14 when the reproducer-frame 12 strikes the abutment 11 and rocks the adjustable lever on its pivot. It is to be noticed that a slot 17 is cut in lever 7 to allow for horizontal adjustment between the lever 7 and carrier 5, whereby the abutment 11 is maintained in proper relation to the reproducer-frame.

The operation of my automatic stop mechanism is as follows: Assuming that the abutment or indicator is set at the end of the indentations on the cylinder or record, the lever 4 is moved to the left to start up the motor of the phonograph. This operation also moves the actuator 13 to the left against the tension of the spring 16, which movement causes the actuator to drop into the shouldered portion of slot 14. The actuator is held in this position, with the spring 16 under tension, until the reproducer-frame, which is now moving to the right, strikes the abutment 11 of lever 7, thereby rocking it on its pivot-screw 9 and raising the actuator out of engagement with the shoulder of slot 14. Thus released, the spring 16 draws the actuator 13 and lever 4 to the right, stopping the phonograph-motor and arresting further rotation thereof.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by equivalent means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a device of the character described, the combination of a phonograph, a motor mechanism, a lever for starting and stopping said mechanism, an actuator adapted to bear against one side of the lever, and means

controlled by said motor mechanism for moving said actuator against said lever to move it into a stop position.

2. In a device of the character described, a phonograph and a starting-lever therefor, in combination with an adjustable stop mechanism which is set by the movement of the lever when starting the phonograph into operation.

3. In a device of the character described, a phonograph and a starting-lever therefor, in combination with a stop mechanism comprising a carrier or support, an adjustable pivoted lever, means for adjusting the lever, an actuator in working relation with the starting-lever mounted in the carrier, a spring for actuating the actuator to move the starting-lever to its stop position, and means secured to the pivoted lever in the path of the reproducer-frame to be actuated thereby for tripping the lever to release the actuator.

4. In a device of the character described, the combination of a phonograph, a reproducer, a motor mechanism, a lever for starting and stopping said mechanism, an actuator adapted to bear against one side of the lever, and means controlled by said reproducer for moving the actuator against the lever to move said lever into its stop position.

5. In a device of the character described, a phonograph and a starting-lever therefor, in combination with a stop mechanism comprising a carrier or support having a slot therein which is provided with a shoulder, a pivoted lever on the carrier, means for tripping the lever by movement of the reproducer-frame, means in said slot for actuating the starting-lever which is adapted to engage

with said shoulder and is released from the latter by movement of the lever, and a spring for actuating said means when the latter is released.

6. In a device of the character described, a phonograph and a starting-lever therefor, in combination with a stop mechanism comprising a carrier or support having a slot for the actuator which is provided with a shoulder for holding the latter in a set position, a pivoted lever therefor, an abutment on the lever, an actuator which operates the starting-lever, a spring secured to the actuator and carrier which is under tension when the actuator is in a set position, and a means for disengaging the actuator from the shoulder of the slot for actuating the starting-lever and thereby stopping further rotation of the phonograph-cylinder.

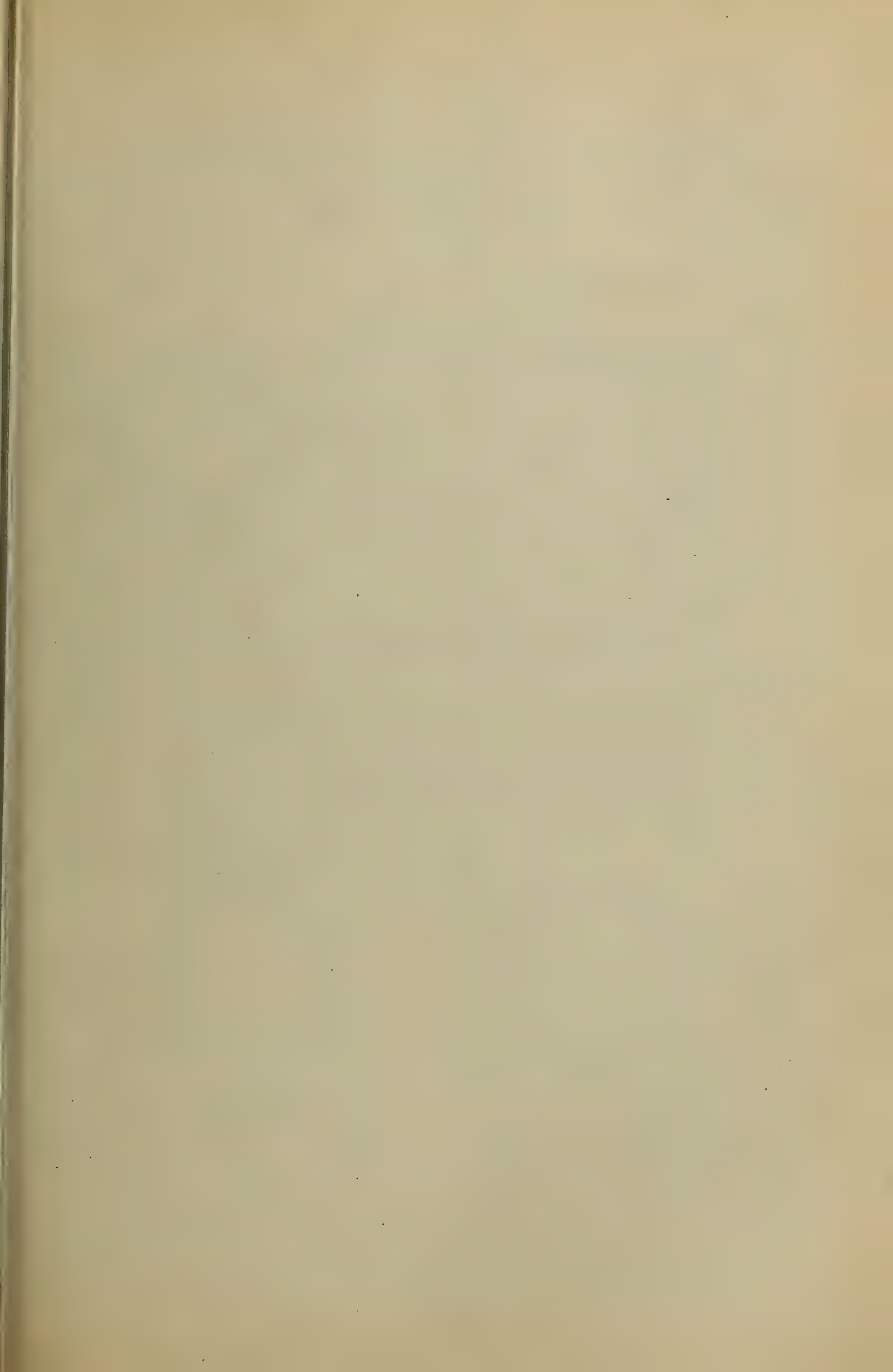
7. In a device of the character described, a phonograph and a starting-lever therefor, in combination with a stop mechanism comprising a carrier or support, an adjustable pivoted lever, means for adjusting the lever, an abutment or indicator on the lever, an actuator in working relation with the starting-lever mounted in the carrier, a spring for actuating the actuator to move the starting-lever to its stop position, and means secured to the pivoted lever in the path of the reproducer-frame to be actuated thereby for tripping the lever to release the actuator.

In witness whereof I have hereunto set my hand this 23d day of December, 1904.

CHARLES OTZEN.

Witnesses:

EDWARD WILLIAMS, Jr.,
GEORGE A. THORNTON.



No. 850,256.

PATENTED APR. 16, 1907.

W. C. RUNGE.
PHONOGRAM.

APPLICATION FILED JUNE 23, 1906.

Fig. 1:

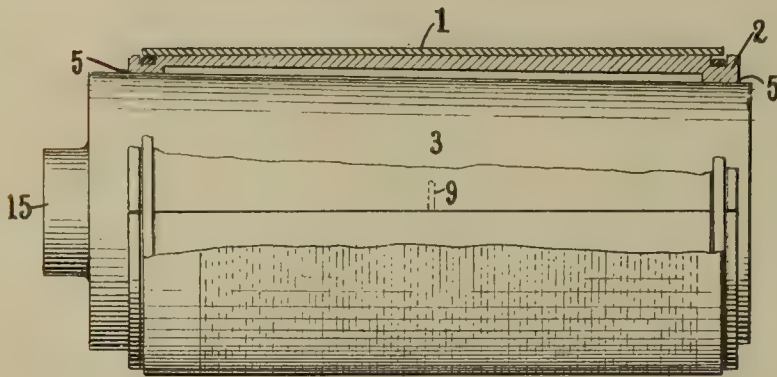


Fig. 2:

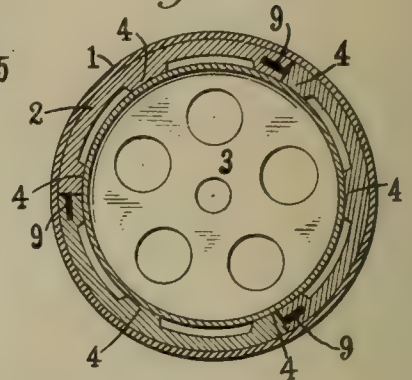


Fig. 3:

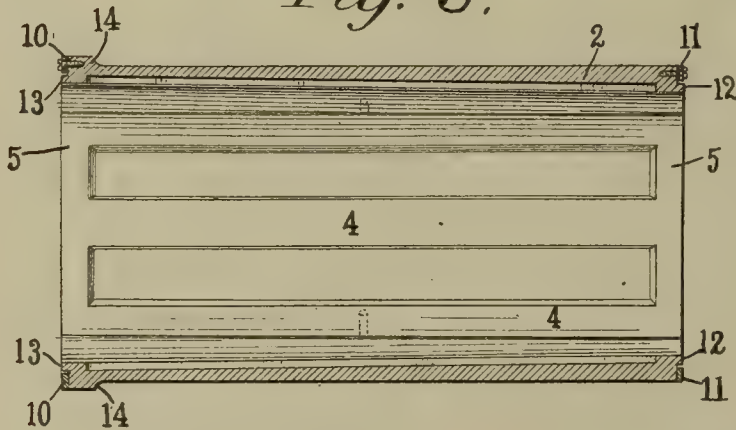


Fig. 6:

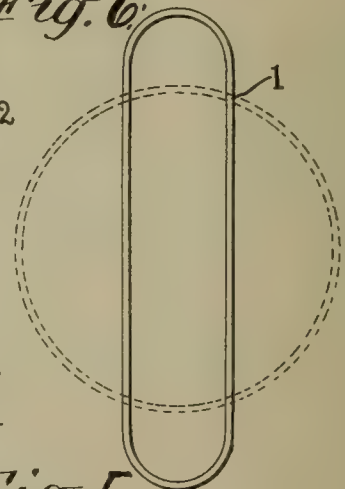


Fig. 4:

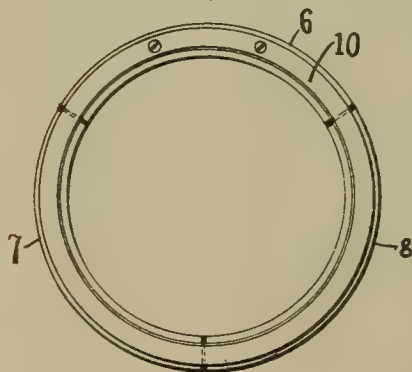
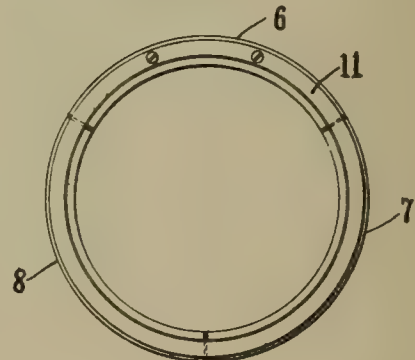


Fig. 5:



WITNESSES:

J. M. Rose

Conrad Liehl

Walter L. Runge, INVENTOR,

BY
Robt. B. Killgore,
ATTORNEY.

UNITED STATES PATENT OFFICE.

WALTER C. RUNGE, OF CAMDEN, NEW JERSEY, ASSIGNOR TO INTERNATIONAL ROYAL PHONE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PHONOGRAM.

No. 850,256.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed June 23, 1906. Serial No. 323,030.

To all whom it may concern:

Be it known that I, WALTER C. RUNGE, a citizen of the United States, residing in Camden, Camden county, New Jersey, have invented a new and useful Improvement in Phonograms, of which the following is a specification.

My invention relates to phonograms in which the sound-record is impressed on a flexible record-film which is distended and supported on a detachable sleeve adapted to engage the ordinary graphophone-mandrel.

One object is to so construct the sleeve that it will be self-sustaining and capable of uniform radial expansion.

Another object is to reduce the weight and facilitate the storage and transportation of the record-film and to eliminate breakage thereof.

Another object is to provide mechanism by which the record-surface will run concentrically with the mandrel-shaft and true with respect to the reproducer.

I attain these objects in the manner shown in the accompanying drawings, in which—

Figure 1 is a view, partly in section, of my improved phonogram on a mandrel; Fig. 2, a sectional view of the structure of Fig. 1; Fig. 3, a sectional view of a modification of the structure of Fig. 1; Figs. 4 and 5, views of the ends of the structure of Fig. 3; and Fig. 6 is an edge view of my improved record-film, indicating the manner in which it may be collapsed for storage.

Like reference characters designate like parts throughout.

The record-film 1 is in the form of a cylindrical or slightly conical tube of celluloid or like material having the sound-waves impressed in the outer surface thereof. This record, as shown in Fig. 6, is capable of being flattened for transportation.

To distend and support the record 1 during reproduction, an expanding mandrel sleeve or shell 2, of any suitable rigid material, is used. This sleeve is bored inside to the same taper as the graphophone-mandrel 3, and the outside diameter and shape is the same as the interior of the record-film.

To decrease friction between the sleeve 2 and the mandrel 3, the material may be re-

moved from the interior of the sleeve, leaving the ribs 4 and bearing-rings 5.

In order that the sleeve may be expansible radially to receive, distend, and support the record 1, it is made in a plurality of segmental longitudinal sections 6 7 8 and provided with means for preventing lateral displacement of the sections with respect to each other and with means for maintaining them in substantially cylindrical form.

As shown in Figs. 1 and 2, the means for preventing lateral displacement comprise the dowels and holes 9. Channels may be made in the outer face of the sleeve and elastic bands or springs slipped therein to maintain the sections in cylindrical form.

As shown in Figs. 3, 4, and 5, the grooves are made in the edges of the sleeve, and rings 10 and 11 are secured to one of the sections engaging the small steps or shoulders 12 and 13 left on the edges of the sections. These rings are of smaller external diameter than the outside of the sleeve to avoid interference in placing record-films on the sleeve.

Various other mechanisms may be employed for holding the sleeve-segments together without departing from my invention, the device shown being merely a preferred form.

A raised flange 14 may be formed near the forward end of the sleeve to act as a stop for the record-film.

In use the record-film is slipped over the sleeve, and both are pushed on the machine-mandrel, as is the case with ordinary phonograms. The pressure is continued until the wedging action of the conical mandrel on the segmental sleeve has distended the record-film and supported it throughout its whole extent. As the sleeve is made to run concentrically with the shaft 15, on which the mandrel is mounted, the record-film will run concentrically therewith, and the sound-record surface will run true with respect to the reproducer, eliminating the throbbing or wavering effect sometimes produced by the eccentric phonograms of commerce. As the record-film is solidly and rigidly supported throughout its entire extent, the volume of sound is constant and the maximum to be obtained, as all the motion imparted by the

sound-waves is utilized in moving the diaphragm and none is wasted in vibrating the phonogram.

I claim—

5 1. A graphophone-mandrel sleeve adapted to be placed on a graphophone-mandrel, comprising longitudinal, segmental sections and means carried wholly by said sections for preventing relative displacement of said sections.
10 tions.

2. The combination of a graphophone-mandrel sleeve adapted to be placed on a graphophone-mandrel, comprising longitudinal, segmental sections; means carried
15 wholly by said sections for preventing relative displacement of said sections; and a thin, flexible record-film mounted on said sleeve and solidly supported thereby during reproduction.

20 3. A graphophone-mandrel sleeve adapted to be placed on a graphophone-mandrel comprising longitudinal, segmental sections provided with internal bearing-rings adapted to frictionally engage the graphophone-mandrel
25 and means carried wholly by said sections for preventing relative displacement of said sections.

4. A graphophone-mandrel sleeve adapted to be placed on a graphophone-mandrel comprising longitudinal, segmental sections,
30 dowels projecting from one longitudinal edge

of a section, the other longitudinal edge being provided with holes adapted to receive said dowels projecting from an adjacent section.

5. A graphophone-mandrel sleeve adapted
35 to be placed on a graphophone-mandrel comprising longitudinal, segmental sections, dowels projecting from one longitudinal edge of a section, the other longitudinal edge being provided with holes adapted to receive
40 the dowels of an adjacent section, a channel extending circumferentially around the outer face of said sleeve and means in said channel to prevent the complete separation of the sections.
45

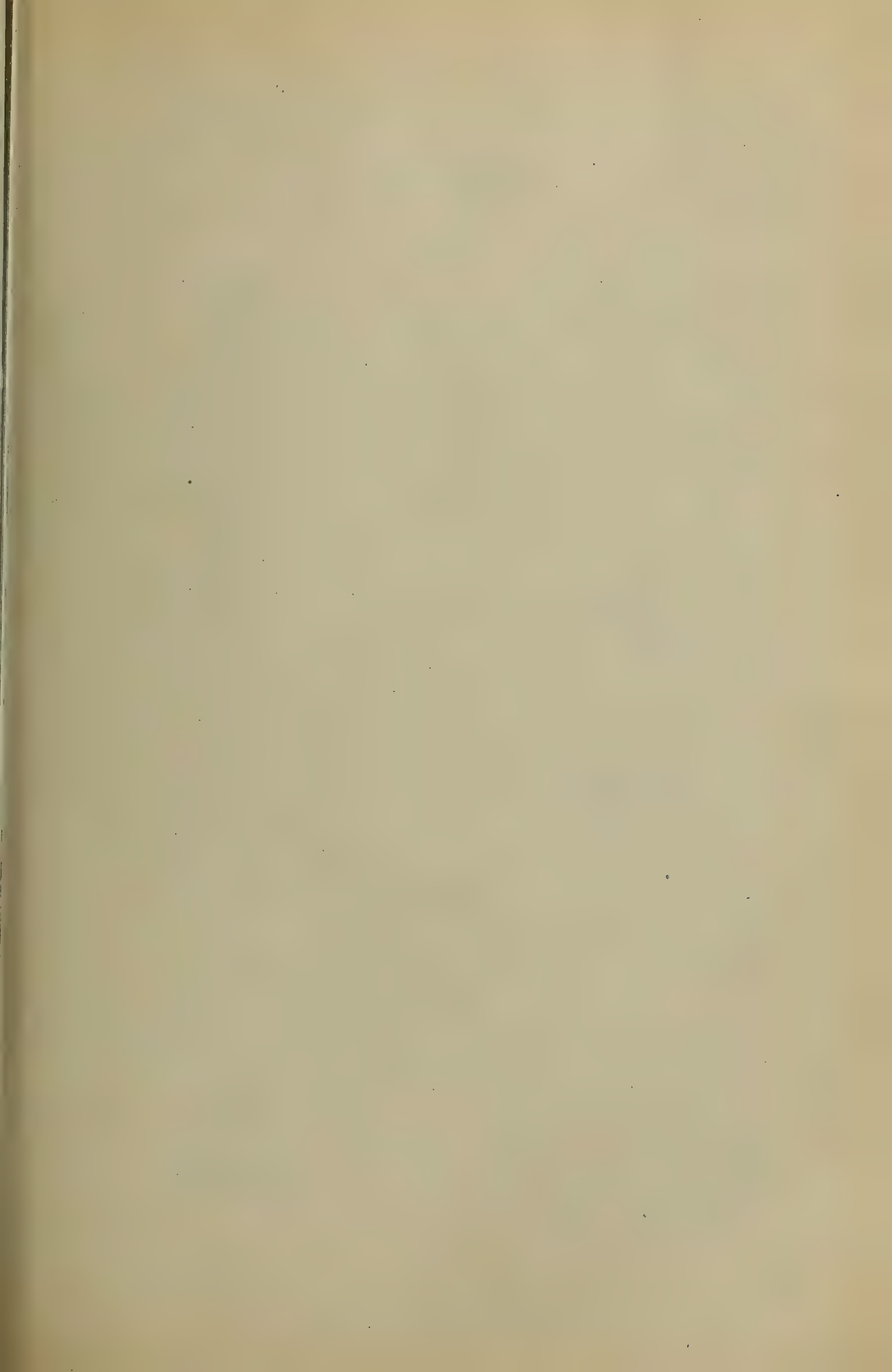
6. The combination of a tapered graphophone-mandrel a sleeve tapered inside and adapted to engage said mandrel, the outer face being substantially cylindrical and concentric with the mandrel; a substantially
50 cylindrical record-film carried on the outer face of said sleeve concentrically with the mandrel; said sleeve being composed of a series of longitudinal, segmental sections and means carried wholly by said sections for preventing relative displacement of the sections.
55

In testimony whereof I have hereunto subscribed my name this 22d day of June, 1906.

WALTER C. RUNGE.

Witnesses:

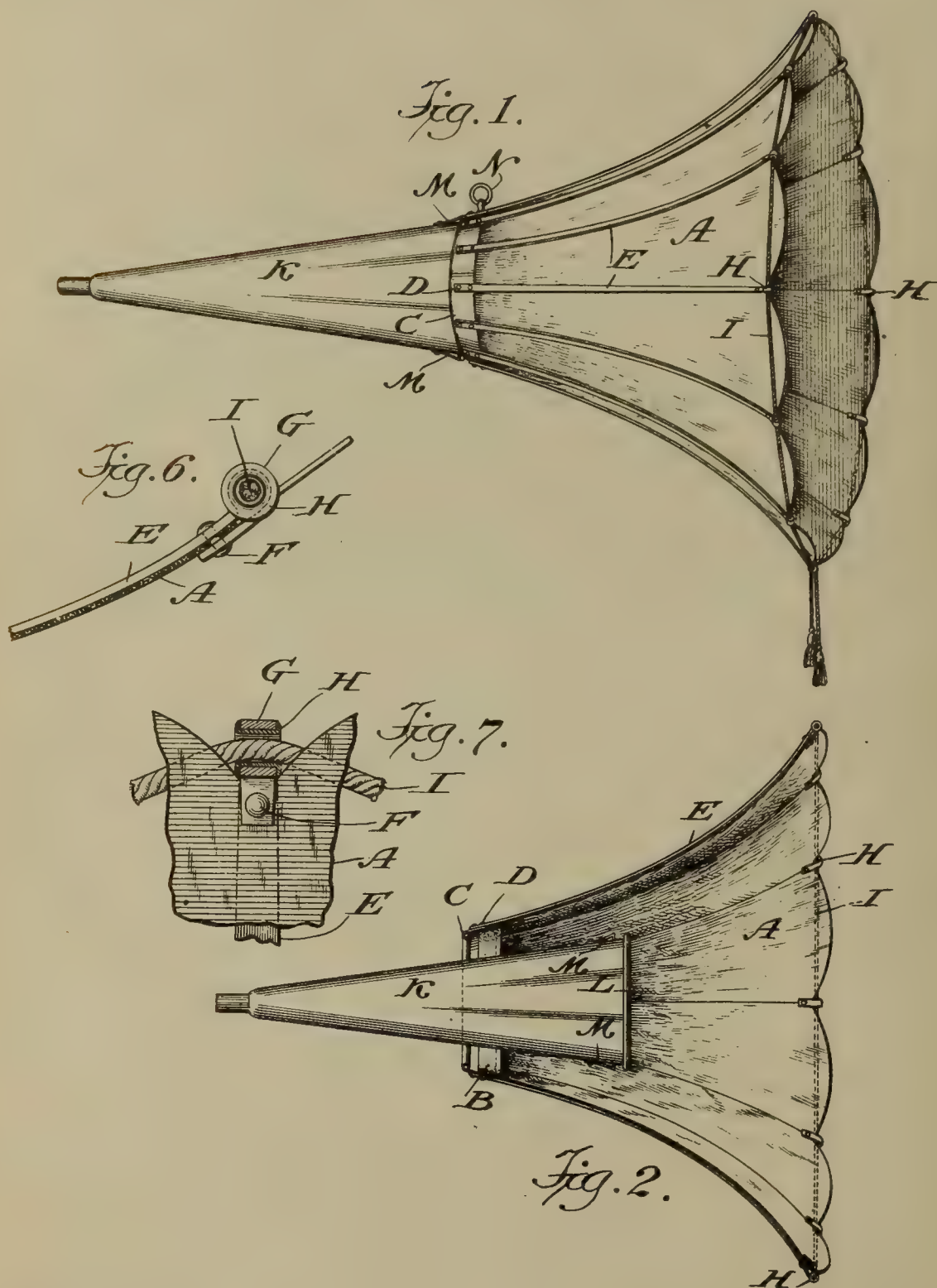
ROBT. B. KILLGORE,
F. M. ROSE.



O. KRAUS.
FOLDING HORN.

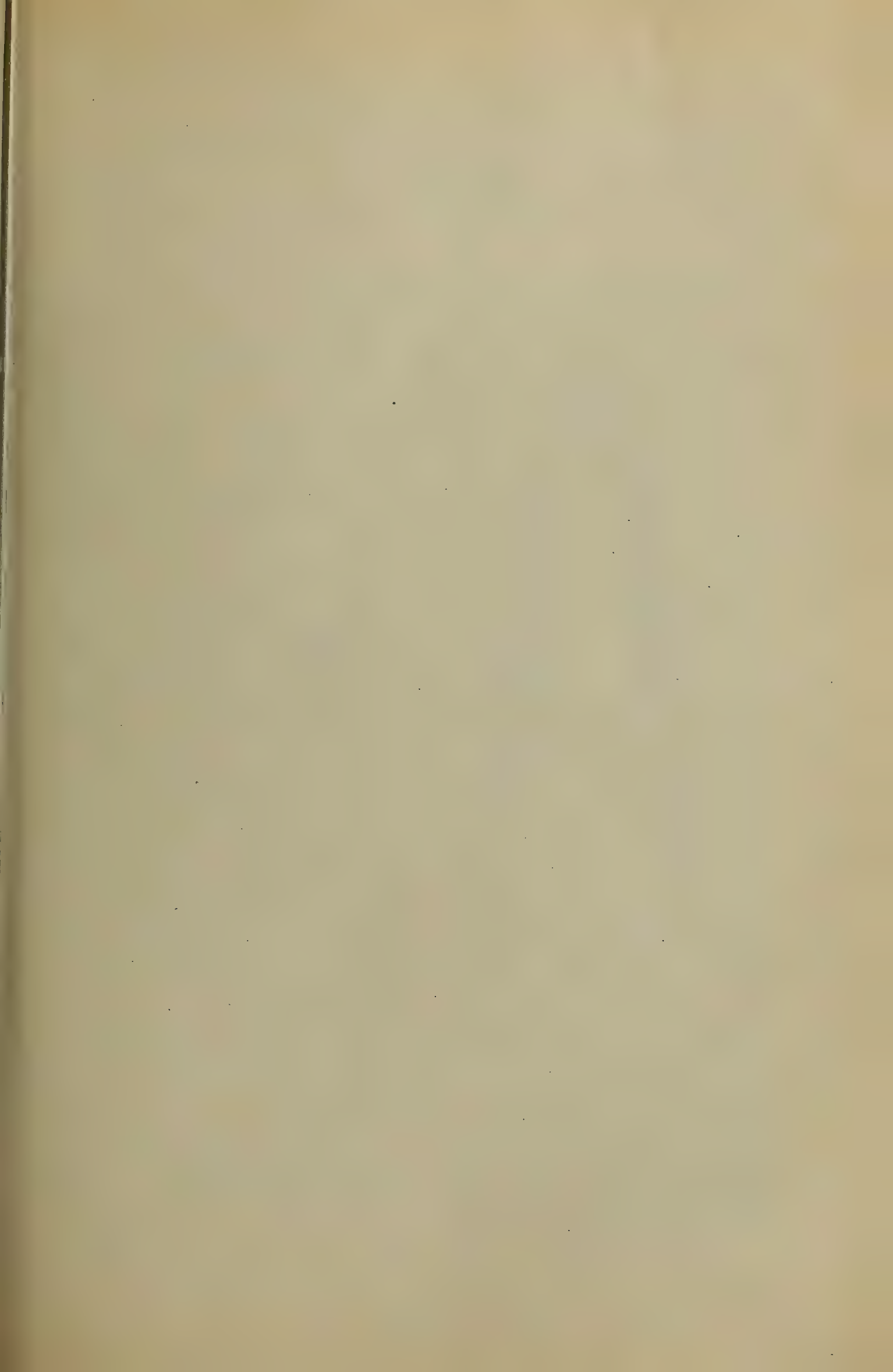
APPLICATION FILED NOV. 12, 1906.

2 SHEETS—SHEET 1.



Witnesses
A. R. Rippleman
A. B. Blackwood.

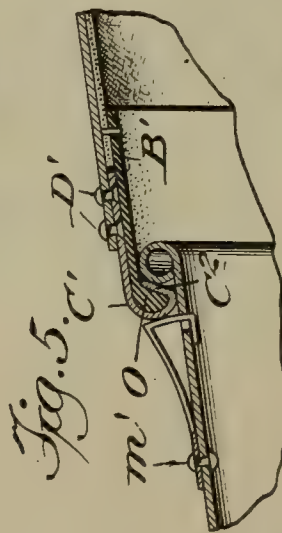
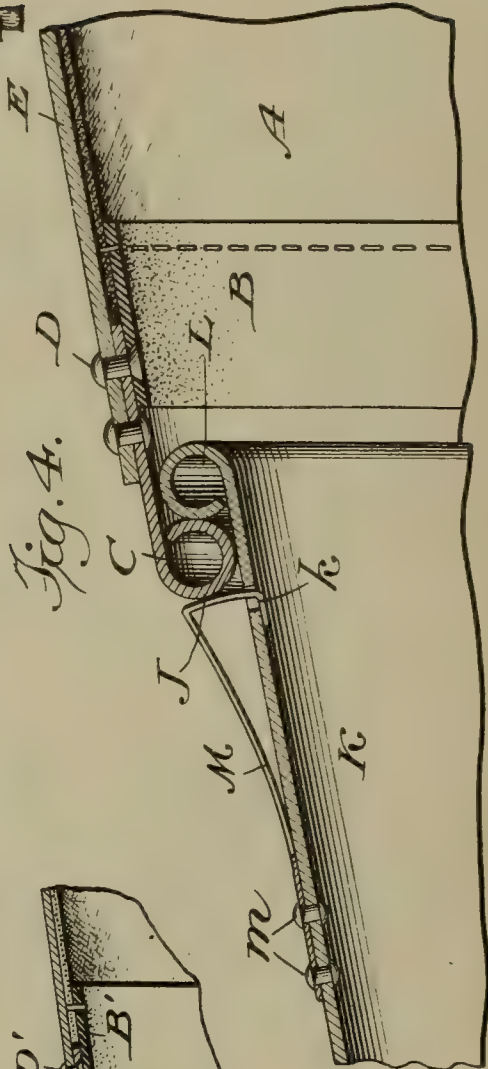
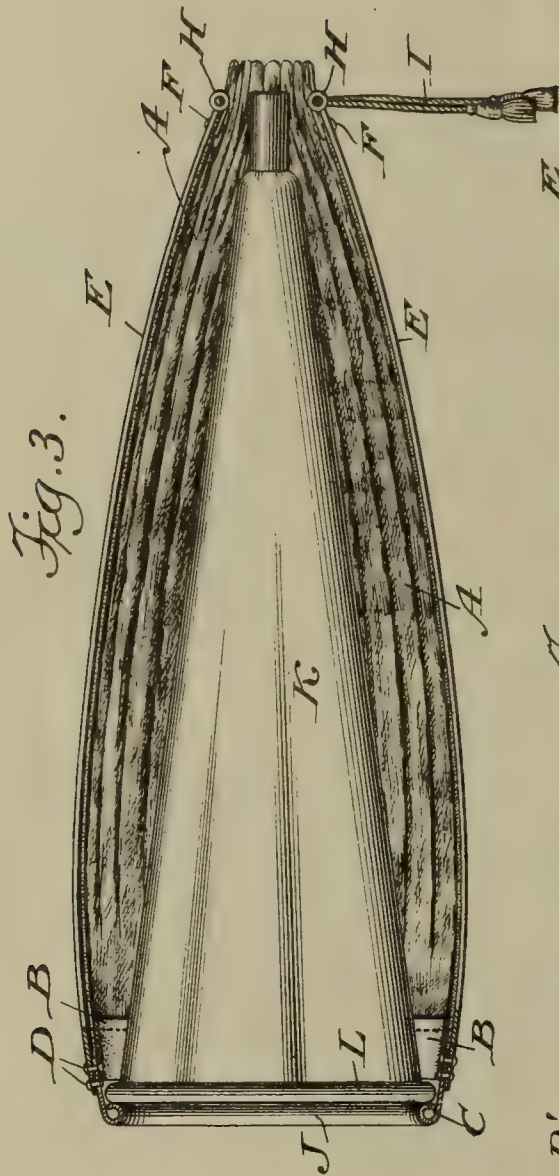
Inventor
O. Kraus



O. KRAUS.
FOLDING HORN.

APPLICATION FILED NOV. 12, 1906.

2 SHEETS—SHEET 2.



Witnesses
A. R. Appleman
A. B. Blackwood.

Inventor
O. Kraus

UNITED STATES PATENT OFFICE.

OTTO KRAUS, OF NEW YORK, N. Y.

FOLDING HORN.

No. 850,375.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed November 12, 1906. Serial No. 342,960.

To all whom it may concern:

Be it known that I, OTTO KRAUS, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Folding Horns, of which the following is a specification.

This invention relates to improved amplifying-horns for phonograph or similar instruments and all other sound-distributing devices, and has for its main object to provide a horn of a peculiarly novel and simple construction which may be folded when not in use to occupy a small space for convenient transportation or storage.

The construction of the device is such that the horn may be instantly folded by the pulling of a cord or expanded for use by the release of said cord.

There are other important features in connection with this invention, which, besides those alluded to, are clearly set forth in the subsequent detailed description.

In the accompanying drawings, in which like letters of reference indicate like parts in all the figures, Figure 1 is a perspective view of the horn, showing same in its open or expanded position. Fig. 2 is a longitudinal section of the horn when expanded, showing the reduced and conical-shaped portion disconnected from the collapsible part of the horn. Fig. 3 is a longitudinal section of the horn when folded. Fig. 4 is a longitudinal section showing the connecting device of the two main sections of the horn on an enlarged scale. Fig. 5 is a modification showing how the flexible fabric of the horn may be fastened to the metallic sleeve. Fig. 6 is a detailed view showing part of a spring and its eyelet with the fabric and the cord in section. Fig. 7 is a detailed and partial sectional view of the parts described in Fig. 6.

A represents the body of the horn, which is preferably made of cloth, silk, leather, or other flexible material, and is fastened at its narrow end to the elastic portion B, Fig. 4, which in turn is held to sleeve C with rivets D. The large end of horn-body A is securely held between portions of springs E with rivets F, Figs. 6 and 7. These springs are tapered and form at their narrow ends eyes or loops G, in which are inserted eyelets H for facilitating the smooth travel of cord I.

The wider ends of springs E are riveted to the metal sleeve C, the opening of which is

reduced by forming the metal into a curl J, as shown clearly in Fig. 4. The conical metal portion K with its curled end L coacts with curl J on sleeve C.

The springs M with their tendency to force curls L and J together complete the locking device, which makes a snug and convenient connection between the sleeve C and the portion K. The metal springs M are secured with rivets *m* and have a tendency to spring away from portion K. Slots *k* form guides and means for permitting springs M to be depressed until portion K may be slipped through sleeve C for removal of portion K.

The springs E are of considerable stiffness and have a tendency to hold the body A in an expanded or open position. The cord I passes through all the eyelets on springs E, going around the outer surface of body A.

The ring N, Fig. 1, serves to support the horn when in use with a phonograph or like instrument.

In the modification Fig. 5 the elastic or rubber portion B' instead of being fastened to the sleeve C' with rivets has an enlarged or thickened end portion O, which is held securely after pressing the flange C² in position.

In manipulating this novel folding horn it will be readily seen that the springs E will expand the body A, holding the fabric smooth and rigid between them. The elastic or rubber portion B will help to stretch the fabric longitudinally, thus causing the fabric to lie smooth in all directions.

When it is desired to fold the horn, the springs M are pressed inwardly and the portion K removed and placed in a reversed position, as shown in Fig. 3. Then cord I is pulled, causing springs E to close in and fold the body A. Winding the cord I several times about the body A will prevent any accidental reopening of the springs.

It will be noted that the normal tendency of the springs E is to assume such outward position as will serve to bring and maintain the material of the horn-body A to the extreme limit of its expanding capacity. This not only conduces to a smooth and unobstructed interior surface for said body, but will operate to take up any looseness of the fabric that might be occasioned by stretching or other cause. The arrangement of the contracting means contiguous to the mouth of the horn-body not only results in great simplicity in the construction, but also contributes to convenience of operation and the

neat and artistic appearance of the horn generally.

I do not wish to be understood as limiting myself to the precise arrangement and construction of parts shown and described, but reserve the right to all modifications within the scope of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A folding horn, comprising a plurality of springs, having normally an outwardly-expanding tendency with relation to each other, a body of flexible fabric held to the ends of said springs, and means for forcing the ends of said springs inwardly.

2. A folding horn comprising a plurality of springs normally having an outwardly-expanding tendency with relation to each other, a body of fabric fastened to the springs, loops on said springs, for engaging a cord or flexible member, and an elastic portion secured to one end of said body.

3. A folding horn comprising a plurality of springs, secured to a sleeve and normally having an outwardly-expanding tendency with relation to each other, a body of fabric fastened to the springs, an elastic member connected to the fabric, loops on said springs, and a flexible member engaging said loops.

4. A folding horn, comprising a plurality of springs, normally having an outwardly-expanding tendency relative to each other, loops near the ends of said springs and contiguous to the horn-mouth, and a cord or flexible member within said loops.

5. A folding horn, comprising a sleeve, a plurality of springs secured to said sleeve, and normally having an outwardly-expanding tendency with relation to each other, a conical portion in detachable relation to said

sleeve, and a locking-spring to prevent the accidental disengagement of said conical portion.

6. A folding horn, comprising a plurality of springs and contiguous to the horn-mouth, loops near the ends of said springs, eyelets in said loops, a cord passing through the eyelets, and a body of flexible fabric attached to said springs.

7. A folding horn, comprising a sleeve, a plurality of springs normally having an outwardly-expanding tendency relative to each other, loops on said springs, a cord, a body of fabric, and an elastic portion adapted to lie between said body of fabric and said sleeve.

8. A folding horn, comprising a sleeve, a plurality of springs secured to said sleeve and normally having an outwardly-expanding tendency relative to each other, and a conical portion adapted to lie within said sleeve in a reverse position.

9. A folding horn, comprising a plurality of springs and normally having an outwardly-expanding tendency relative to each other, a body of flexible fabric connected to said springs and a conical portion adapted to lie within said body when the horn is in a folded condition.

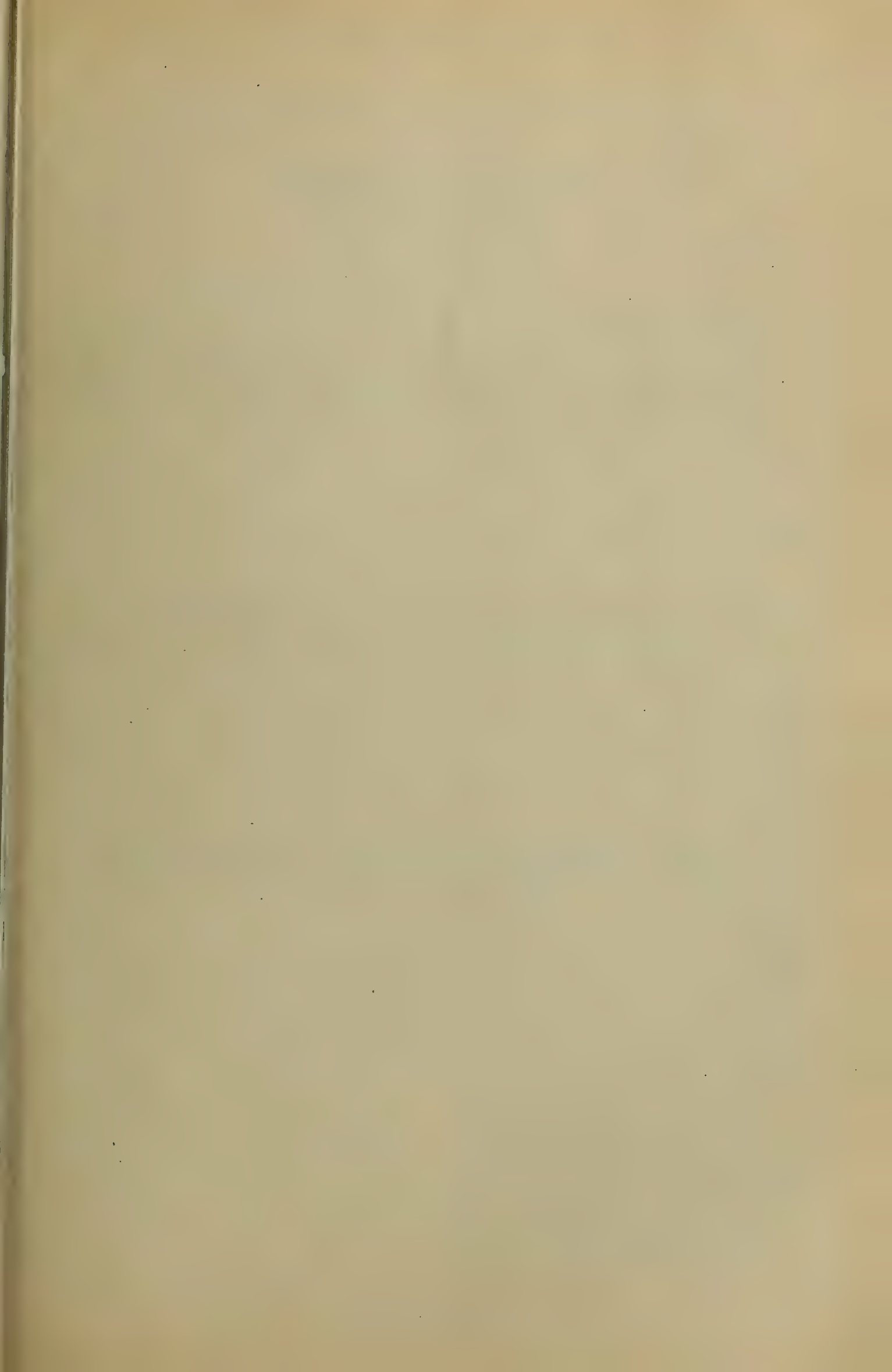
10. A folding horn comprising a body of flexible material, and means for normally expanding and holding expanded said body to the limit of its expanding capacity and means for contracting said body.

Signed at New York city, in the county of New York and State of New York, this 10th day of November, A. D. 1906.

OTTO KRAUS.

Witnesses:

ALBERT MENDELSON,
MADALINE WICKHILLER.



No. 850,494.

PATENTED APR. 16, 1907.

J. SANDERS.
GRAMOPHONE RECORD TABLET.
APPLICATION FILED JAN. 17, 1906.

Fig. 1.

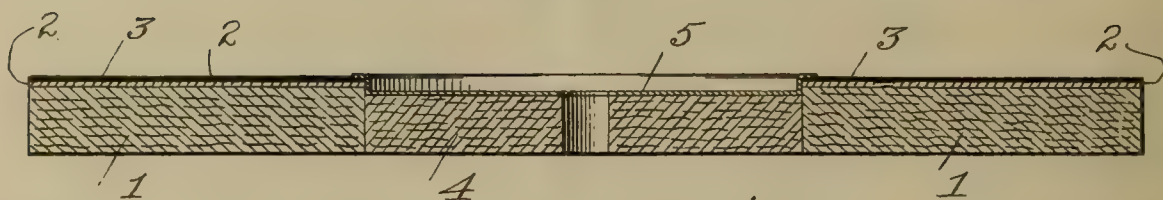


Fig. 2.

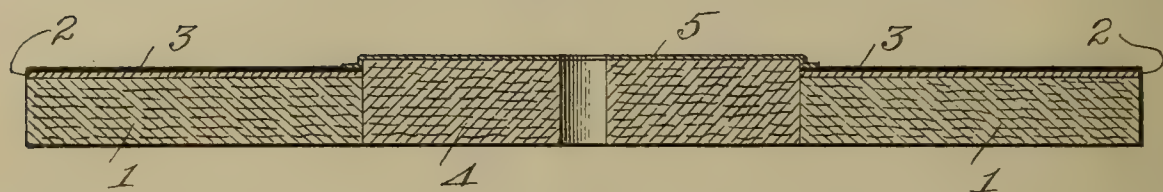
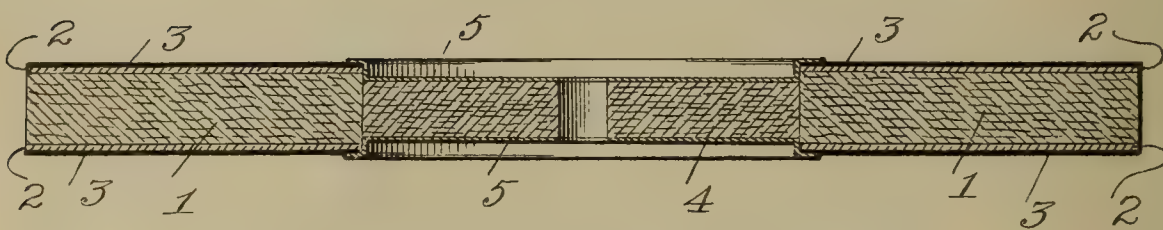


Fig. 3.



Witnesses

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Inventor

Joseph Sanders

By

Louis Bisio.

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

GRAMOPHONE RECORD-TABLET.

No. 850,494.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed January 17, 1905. Serial No. 241,485.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophone Record-Tablets, of which the following is a specification.

My invention has reference to improvements in gramophone record-tablets, one of the objects of the improvement being to cheapen the manufacture of such tablets by saving a considerable percentage of the costly gramophone-record material which is used in the manufacture of the same.

Gramophone record-tablets are universally made in disk form with a spiral record-groove impressed either in one or on both sides of the tablet, and it has generally been the practice to either depress or elevate the central portion of the tablet, which contains no record-groove, and to secure to that central portion a label bearing the name of the manufacturer, a legend descriptive of the piece of music, song, or speech that is recorded on the tablet and perchance also other information for the user. This label, which is ordinarily a disk of paper having a distinctive color or print, usually extends over the edge of the depressed or elevated blank center of the record-tablet. Heretofore such record-tablets were made of a solid body of record material, which is very expensive, and the depression or elevation in the blank center was produced in the act of impressing the record-groove. When the tablet was made with a depressed center, a thin disk of steel or other metal was placed in the center of the record-matrix and of a thickness corresponding to the depth of the depression which the tablet was to have. When the tablet was made with a raised blank center, the central part of the matrix was turned out to the requisite depth. In both cases, but particularly when the center was made depressed, every part of the tablet had to be subjected to the same uniform pressure, and this pressure must, in the nature of the case, be very great, amounting to as much as two thousand pounds per square inch. Now the depressed or elevated portion of the tablet represents about one-fifth of the total area of the tablet, and one of the objects of my invention is to save the pressure which heretofore was expended upon this blank part of the tablet.

Figures 1, 2, 3 represent cross-sections of record-tablets constructed in accordance with

my invention, the vertical scale of the drawings being largely very exaggerated for the sake of clearness of illustration.

Referring now to Fig. 1, the main body of my improved tablet is shown as an annulus 1, which I make of cardboard or other stiff fibrous material and which I impregnate, or nearly so, with a sizing, and preferably with a sizing that softens under heat and hardens when cooled. I have used with advantage a solution of rosin, into which the cardboard annulus is dipped. Of course other suitable sizing may be used. Upon the face of this cardboard annulus is a sheet 2 of paper or other flexible fibrous material, coated either on one or on both sides with an exceedingly thin layer 3 of record material. This paper is cemented onto the cardboard annulus either by the record material on its under side or by a separate cement or by the sizing in the cardboard if the same is of a kind that softens under heat, and this cementing is preferably, but not necessarily, accomplished at the same time as and by the act of impressing the record-groove into the surface of the prepared paper by the matrix. In the large central opening of the cardboard annulus is a web 4 of a thinner cardboard, which is also sized, and preferably with the same sizing that is employed for the annulus 1, and this web is fitted in place with its lower surface flush with the under surface of the annulus and with its upper surface below the upper surface of the annulus, as shown, and is cemented to the annulus preferably, but not necessarily, by and in the act of impressing the record-groove, since when this is being done the cardboard and also the matrix are heated, so that the resinous sizing in the annulus and the web fuse together. It is not necessary to subject the web portion of the tablet to surface pressure, although a very moderate pressure may be exerted with advantage for reasons which will presently appear. If the sizing employed is not of a kind that will soften under heat, the web would naturally be cemented into the annulus in any other manner than hereinbefore described. The label is represented in this drawing at 5, and if the sizing employed is of a kind that softens under heat this label may be cemented onto the web and over the inner edge of the annulus by and during the act of impressing the record-groove into the record material 3, and in this case a steel or other metal disk is used on the center of the matrix,

as is a common practice; but since the central part of the tablet constructed as here shown is already depressed this central portion need only be subjected to a very moderate pressure, just sufficient to flatten out the label. In this manner a considerable saving of power is secured. By reason of the fact that with this construction the base of the tablet is made of two parts, the annulus and the web, each of these parts may be more readily impregnated with the sizing than if a solid disk of cardboard were used. The layer of record material upon the paper annulus need not be thicker, but may be thinner, than one one-hundredth of an inch. The same saving of record material I can also secure by dispensing with the paper annulus altogether and applying the layer 3 of record material directly to the surface of the cardboard annulus. With this construction, the same as in the one where the coated paper annulus is employed, the edge of the label becomes cemented onto the record material, and in both cases the label itself reinforces the connection between the central web and the cardboard annulus.

Fig. 2 represents the construction of my improved tablet wherein the central web 4 is thicker than the annulus 1, so that its upper surface slightly rises above the upper surface of the annulus. In all other respects the construction is the same as that shown in Fig. 1; but when this construction is employed the central blank part of the record-matrix must be turned out to the requisite depth—namely, to a depth corresponding to the elevation of the central web above the upper surface of the annulus. In this case also the prepared paper 2 may be dispensed with and the record material 3 may be applied directly onto the cardboard annulus.

In Fig. 3 the construction of my improved tablet is shown, wherein both faces of the tablet are utilized—that is to say, where a record is impressed upon each face. In this case the central web 4 is made considerably thinner than the annulus, and it is so lodged within the annulus as to leave a central depression on each side. In such case a prepared sheet of paper is applied to each face of the annulus, and a label is applied to each face, as is clearly indicated in the drawings. When this construction is employed, each of the two matrices which are used for impressing the record-groove on the two sides of the tablet is provided with a central disk of steel or other metal and of a thickness corresponding to the depth of the depressions on the two sides of the tablet. In this case also the prepared paper may be dispensed with and the record material directly applied to the cardboard annulus on each face thereof.

The construction of the tablet in two principal parts, the annulus and the central web, secures some of the advantages of my inven-

tion even in the case when the central web is neither thinner nor thicker than the annulus, but is of the same thickness, for even in that case only the annulus will be coated with the record material, thus saving the portion which would otherwise go onto the central blank part of the tablet. In such case the central disk, which is cut out to obtain the annulus, would after the annulus has been either coated directly with record material or after a sheet of paper coated with record material has been applied to it be replaced into the center of the annulus and cemented to the same either in the act of impressing the record-groove or separately before the record-groove is impressed. With this construction, however, the saving of power secured in the construction of the forms of tablet hereinbefore described would be lost, since when the tablet is of uniform thickness all throughout the central part has to be subjected to the same pressure as the other parts.

In all the forms of tablet herein set forth it is not necessary to impress the record-groove before the article is put on the market or on sale, since blank tablets constitute complete articles of manufacture which can be furnished to manufacturers for impressing record-grooves therein.

The cardboard annulus itself prepared in the manner hereinbefore described and adapted to have a central web fitted into it and cemented thereto may be furnished to manufacturers either with or without the central web already secured in place, so that the prepared annulus is itself a complete article of manufacture.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. A disk-shaped sound-record tablet consisting of an annular fibrous base having its inner and outer diameters so related as to include between them a surface approximately that of a possible sound-record, a layer of sound-record-receiving material on the annulus, and a disk-shaped insert of fibrous material secured centrally in and to the annulus.

2. A disk-shaped sound-record tablet consisting of an annular fibrous base impregnated with rosin and carrying on one or both surfaces a thin layer of gramophone-record material, and a disk-shaped insert of fibrous material secured centrally in and to the annulus.

3. A gramophone tablet-blank composed of an annulus of cardboard impregnated with sizing and having its inner and outer diameters so related as to include a surface approximately that of a possible sound-record, and a sheet of paper or other thin fibrous material coated with a thin layer of gramophone-record material and fast on one or both surfaces of the annulus.

4. A gramophone record-blank composed of an annulus of fibrous material carrying on one or both surfaces a thin layer of gramophone-record material, and a central web of fibrous material fitted in and secured to said annulus.

5. A gramophone tablet-blank composed of an annulus of cardboard or other stiff fibrous material impregnated with a sizing, and a central web of fibrous material thinner than the annulus and fitted to the latter.

6. A gramophone tablet-blank composed of an annulus of fibrous material impregnated with rosin and carrying upon one or both surfaces a thin layer of gramophone-record material, and a central web thinner than the annulus and fitted to the latter.

7. A gramophone tablet-blank consisting of an annulus of fibrous material impregnated with a sizing and carrying upon one or both surfaces a thin layer of gramophone-record material, and a central web of like fibrous material of different thickness than the annulus and fitted to the latter.

8. A gramophone tablet-blank consisting of an annulus of cardboard or other stiff fibrous material, sized with rosin and having on one or both surfaces a layer of paper or other thin fibrous material coated with a thin layer of gramophone-record material, and a central web of fibrous material fitted in and secured to said annulus.

9. A gramophone tablet-blank composed of an annulus of stiff fibrous material impregnated with a sizing and carrying on one or both surfaces a thin layer of gramophone-record material, and a thinner central web of like material impregnated with a sizing and fitted to the annulus, substantially as described.

10. A gramophone tablet-blank composed of a cardboard annulus impregnated with a sizing that softens under heat and carrying on one or both surfaces a thin layer of gramophone-record material, and a central web of sized cardboard fitted to the annulus, substantially as described.

11. A gramophone tablet-blank, composed of a cardboard annulus impregnated with a sizing that softens under heat and carrying on one or both surfaces a thin layer of gramophone-record material, and a central web of sized cardboard thinner than the annulus and fitted to the latter, substantially as described.

12. A gramophone tablet-blank composed of a cardboard annulus impregnated with a sizing that softens under heat and bearing on one or both surfaces a sheet of paper or other thin fibrous material coated with a thin layer of gramophone-record material, and a central web of sized cardboard fitted to the annulus, substantially as described.

13. A gramophone tablet-blank composed of a cardboard annulus impregnated with a

sizing that softens under heat and bearing on one or both surfaces a sheet of paper or other thin fibrous material coated with a thin layer of gramophone-record material, and a central web of sized cardboard thinner than the annulus and fitted to the latter, substantially as described.

14. A gramophone record-tablet composed of an annulus having a record-groove upon one or both surfaces, and a central web of a different thickness than the annulus and centrally cemented to and within the same, substantially as described.

15. A gramophone record-tablet consisting of an annulus having a record-groove on one or both surfaces, and a central web thinner than the annulus, centrally cemented to and within the same, substantially as described.

16. A gramophone record-tablet consisting of a stiff fibrous annulus carrying a record-groove upon one or both surfaces, with a central web of like fibrous material of different thickness than the annulus and centrally cemented to and within the same, substantially as described.

17. A gramophone record-tablet consisting of an annulus of stiff fibrous material impregnated with a sizing and carrying upon one or both surfaces gramophone-record material with a sound-record impressed therein, and a central web of like fibrous material of different thickness than the annulus and centrally cemented to and within the annulus, substantially as described.

18. A gramophone record-tablet consisting of an annulus of stiff fibrous material impregnated with a sizing that softens under heat and carrying gramophone-record material upon one or both surfaces, with a sound-record groove impressed therein, and a central web of like fibrous and sized material of different thickness than the annulus and centrally cemented within and to the annulus, substantially as described.

19. A gramophone record-tablet consisting of an annulus of cardboard impregnated with a sizing that softens under heat and carrying on one or both surfaces gramophone-record material impressed with a sound-record groove and a central web of sized cardboard centrally cemented within and to the annulus, substantially as described.

20. A gramophone record-tablet consisting of an annulus of cardboard impregnated with a sizing that softens under heat and carrying upon one of its surfaces gramophone-record material impressed with a sound-record groove and a central web of cardboard thinner than the annulus, flush with the under side of the annulus and centrally cemented to and within the latter, substantially as described.

21. A gramophone record-tablet consisting of an annulus of cardboard impregnated

with a sizing that softens under heat and carrying on one of its surfaces gramophone-record material impressed with a sound-record groove; a central web of sized cardboard which is thinner than the annulus and flush with the under side thereof and centrally cemented to and within the same, and a label cemented onto the face of the central web and over the inner edge of the annulus, substantially as described.

22. A gramophone record-tablet consisting of an annulus of cardboard impregnated with a suitable sizing and bearing on one or both surfaces a sheet of paper or other flexible fibrous material coated with a thin layer of record material having a sound-record impressed therein, and a central web of sized cardboard of different thickness than the annulus and centrally cemented to and within the latter, substantially as described.

23. A gramophone record-tablet consisting of an annulus of cardboard impregnated with a sizing that softens under heat and bearing on one side a sheet of paper thinly

coated with gramophone-record material, and a central web of sized cardboard thinner than the annulus and flush with the under side thereof and centrally cemented to and within the annulus, substantially as described.

24. A gramophone record-tablet consisting of an annulus of cardboard impregnated with a sizing that softens under heat, having on one side cemented to it a sheet of paper thinly coated with gramophone-record material, a central web of sized cardboard thinner than the annulus, flush with the under side thereof and centrally cemented to and within the same, and a label cemented onto the face of the central web and over the inner edge of the annulus, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH SANDERS.

Witnesses:

EDWIN S. CLARKSON,
F. T. CHAPMAN.

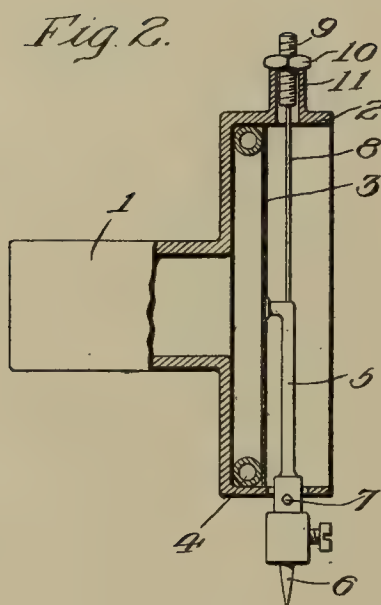
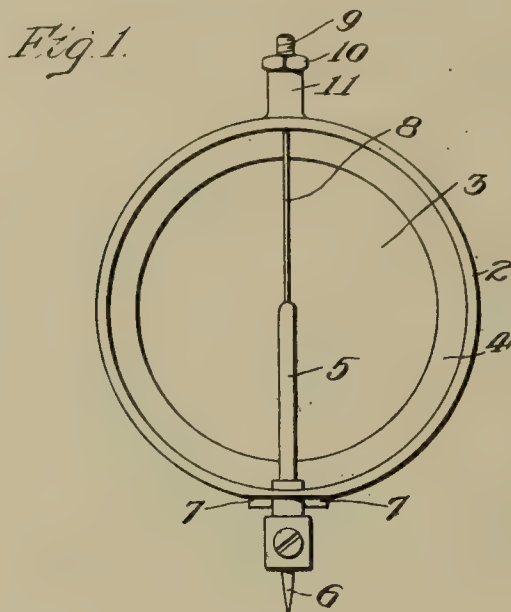
No. 850,883.

PATENTED APR. 16, 1907.

E. D. GLEASON.

SOUND BOX.

APPLICATION FILED FEB. 8, 1907.



INVENTOR

Edward D. Gleason.

WITNESSES

H. J. Hartman.

Samuel B. Kennedy.

BY

Home T. L. L.

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

No. 850,883.

Specification of Letters Patent.

Patented April 16, 1907.

Original application filed July 26, 1902, Serial No. 117,134. Divided and this application filed February 8, 1907. Serial No. 356,319.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and complete disclosure, this application being a division of my application for patent filed July 26, 1902, Serial No. 117,134.

My invention relates to sound-boxes, more particularly to that class of the same in which the stylus is tensioned on its bearings.

The object of my invention is to provide the stylus-lever with an elastic connection or mounting whereby a certain amount of tension will always be imparted to the diaphragm, and better results in reproduction will be attained than when such elastic connection or mounting is not provided.

In the accompanying drawings, Figure 1 is a front view of my sound-box, and Fig. 2 is a sectional view of the same.

The sound-box has a tubular stem 1 with an enlarged or cup-shaped end 2, containing the diaphragm 3, the latter being mounted in this portion of the sound-box in any available manner. Seated in the cup-shaped portion 2 is an internal annular elastic ring 4, which forms a circumferential bearing for the diaphragm 3. The stylus-lever 5 projects through an opening on one side of the cup-shaped portion 2 of the sound-box casing and is provided with a detachable stylus 6. Projecting from opposite sides of said stylus-lever and bearing against a flattened portion on the outside of the case are trunnions 7 7. The said trunnions form an antifriction bearing or fulcrum upon which the stylus-lever can oscillate under action of the undulatory groove of the sound-record upon the stylus 6. A spring 8 is connected with the inner end of the stylus-lever and to that portion of the diaphragm-casing opposite the portion through which the stylus-lever projects. At the connection between the diaphragm-casing and the spring is a threaded rod 9, engaged by a nut 10, the latter bearing upon the outer end of the tubular stud or the boss 11 on the diaphragm-casing, so as to provide for imparting any desired degree of tension to the spring 8 and likewise to the bearing upon which the stylus-bar oscillates.

Having now described my invention, what

I desire to claim and protect by Letters Patent is—

1. In a reproducer, a fulcrumed stylus-bar, a spring engaging said bar for exerting pressure to tension the bearing of said bar, said spring also engaging stationary means on the reproducer to one and the same side of the bearing as the engagement between said spring and bar, the points of engagement between the spring and said bar, between said spring and said stationary means, and the fulcrum-point, being substantially in longitudinal alinement.

2. In a reproducer, a stylus-bar fulcrumed on an antifriction-bearing, and a spring engaging said bar for exerting pressure to tension said bearing in a plane of the axis of oscillation thereof, said spring also engaging stationary means on another part of reproducer to one and the same side of said bearing as the engagement between said spring and bar.

3. In a sound recording and reproducing machine, the combination with a sound-box casing of a diaphragm, a stylus-bar having a transverse bearing, and an elastic and adjustable suspension engaging said stylus-bar in the rear only of said bearing, to hold said bearing in position.

4. In a sound recording and reproducing machine, the combination with a sound-box casing of a stylus-bar having a transverse bearing, a suspension engaging said stylus-bar in the rear only of said bearing, to hold the latter in position, and means adjustably securing said suspension.

5. In a sound recording and reproducing machine, the combination with a sound-box casing of a diaphragm, a stylus-bar mounted on an axial bearing in such a manner as to hold the said bar in contact with the sound-box and against longitudinal movement in one direction, a suspension attached to said stylus-bar and passing diametrically through the sound-box to the opposite side thereof, the said suspension exerting a pressure to hold said bearing under tension against the sound-box casing, and means for adjustably securing said suspension in position.

6. In a sound recording and reproducing machine, the combination with a sound-box casing of a diaphragm, a stylus-bar having an axial bearing on the sound-box casing, to hold the stylus-bar against longitudinal

movement in one direction, a suspension-wire attached to said bar, the said wire exerting a pressure to hold said bearing under tension against the sound-box casing, and an adjusting-nut for securing the wire at the opposite side of said sound-box.

7. In a sound recording and reproducing machine, the combination with a sound-box casing of a diaphragm, a stylus-bar having an antifriction-bearing against said casing to hold the stylus-bar against longitudinal movement in one direction, a suspension-

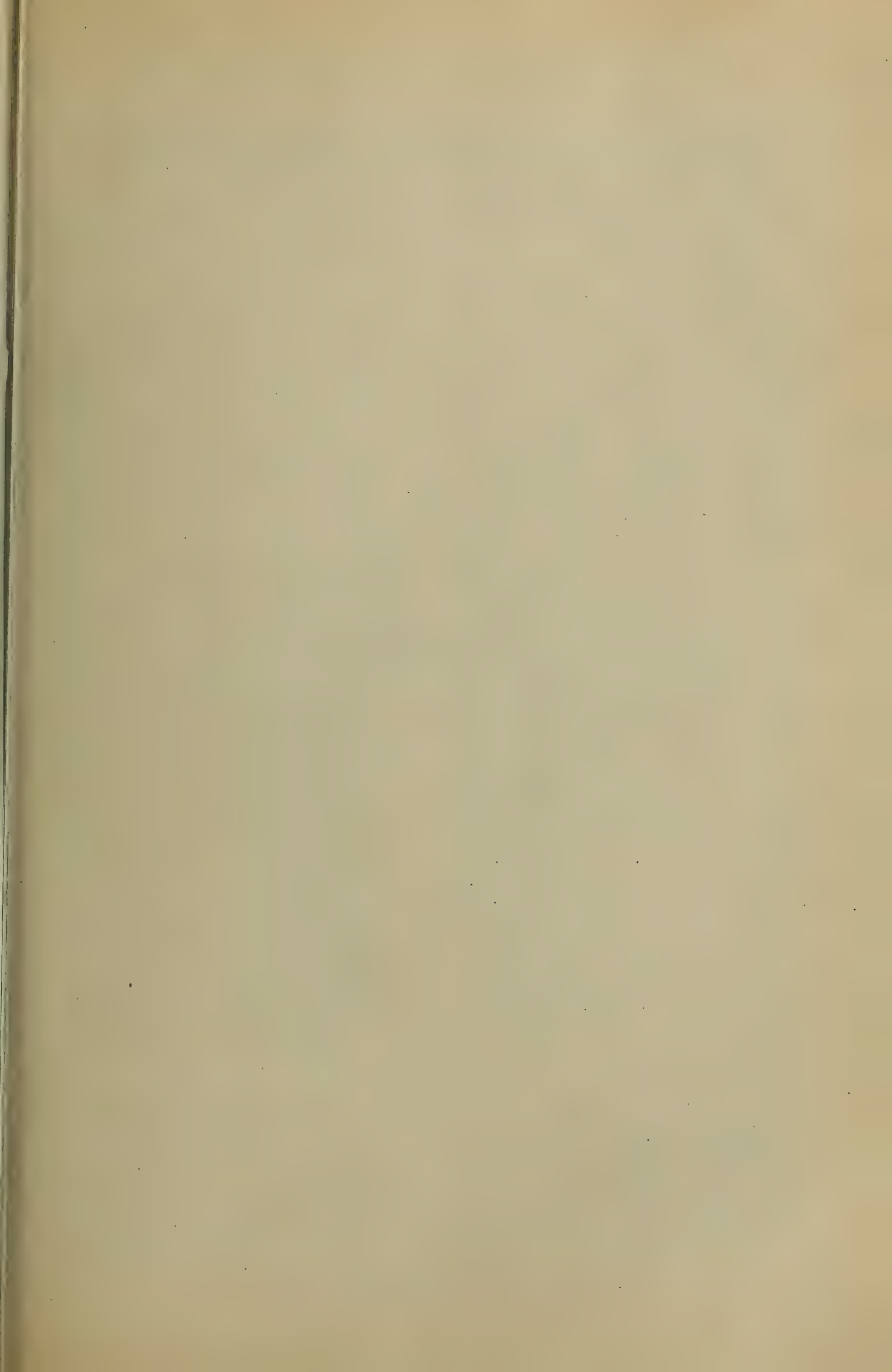
wire attached to the said stylus-bar, said wire tensioning said bearing against said casing, and means at the opposite side of the casing for adjustably supporting said wire. 15

In testimony whereof I have hereunto set my hand this 7th day of February, A. D. 1907.

EDWARD D. GLEASON.

Witnesses:

HARRY COBB KENNEDY,
ALEXANDER PARK.



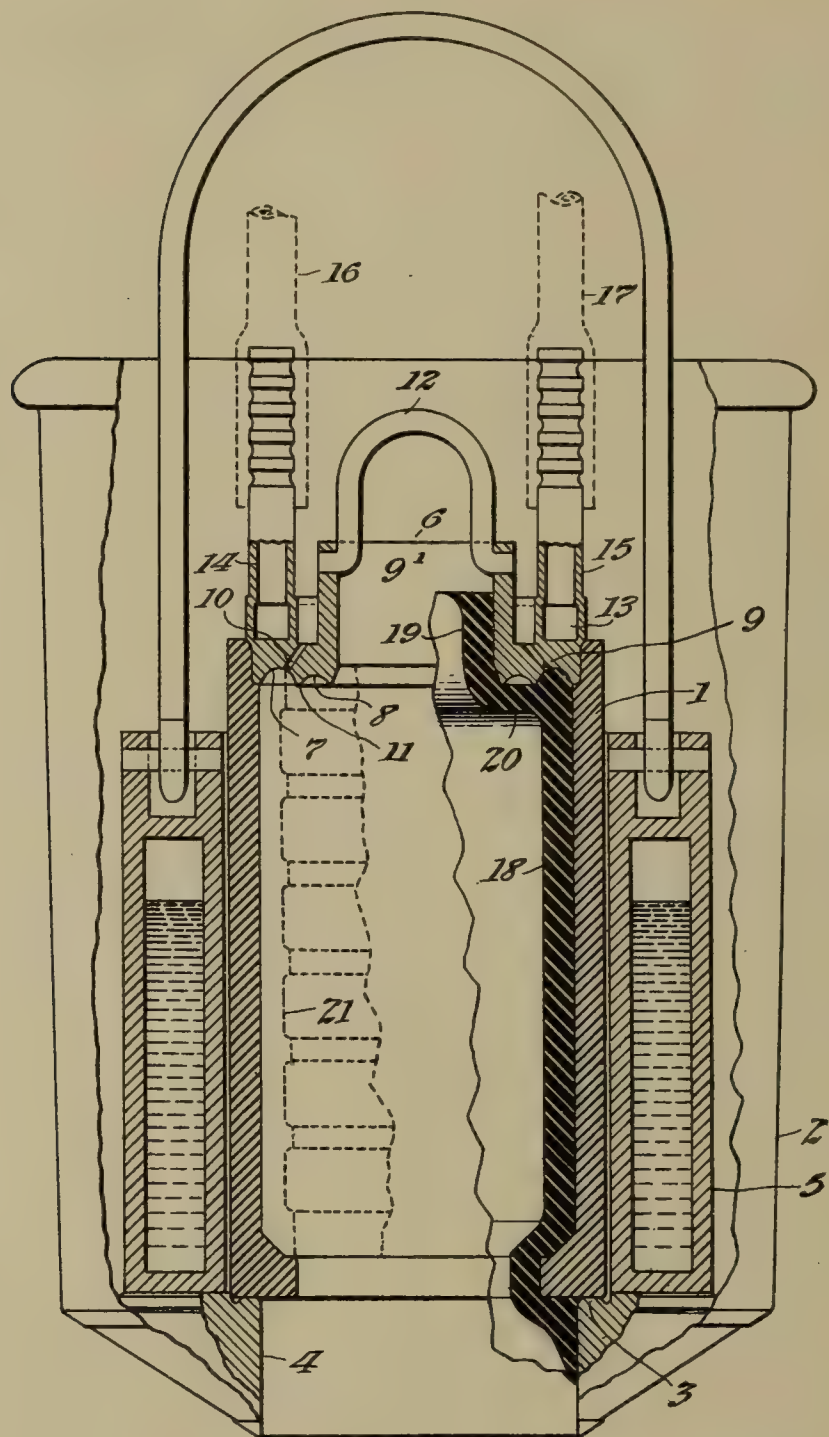
No. 850,957.

PATENTED APR. 23, 1907.

W. F. NEHR.

PRODUCTION OF PHONOGRAPHIC SOUND RECORDS.

APPLICATION FILED JULY 3, 1906.



Witnesses:

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Delos Holden

Inventor:

William F. Nehr

by
Frederic L. Brown

Atty.

UNITED STATES PATENT OFFICE.

WILLIAM F. NEHR, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PRODUCTION OF PHONOGRAPHIC SOUND-RECORDS.

No. 850,957.

Specification of Letters Patent.

Patented April 23, 1907.

Original application filed September 9, 1905, Serial No. 277,800. Divided and this application filed July 3, 1906. Serial No. 324,552.

To all whom it may concern:

Be it known that I, WILLIAM FRANK NEHR, a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Production of Phonographic Sound-Records, of which the following is a description.

This application is a division of an application filed September 9, 1905, Serial No. 277,800, entitled "Production of phonographic sound-records."

My invention relates to the molding of phonographic sound-records, and more particularly to a molding process described and claimed in United States Letters Patent No. 683,615, dated October 1, 1901, to Miller and Aylsworth, wherein a tubular mold is caused to descend into a bath of molten material, which fills the same and congeals upon its interior in a coating or layer which adheres to the same while the mold is lifted out of the bath, after which the record may be finished upon its interior surface and removed from the mold by radial contraction or shrinkage. Heretofore in producing records according to this process it has not been possible to mold the upper end of the record to the shape desired in the finished article, the practice being to form a rough end, which must afterward be removed in any suitable manner, as by a cutter or trimmer of any suitable description.

My invention has for its object the provision of a process whereby such upper end may be molded into a form suitable for the finished article—that is, a surface which will present a smooth and polished appearance and which will be free from depressions, elevations, discolorations, and all forms of roughness or irregularity. With this end in view I have made a large number of experiments to obtain a mold-cap which when placed upon a tubular coreless mold will be capable of molding the upper end of the sound-record in the manner referred to for an indefinite number of operations. From these experiments I have determined that the mold-cap should have a concave surface, the outer edge of which during molding operation adjoins and forms a continuation of the bore of the mold. Preferably the body of the mold should extend above at least the

lower part of said concave surface, so that when the cap is removed from the mold the molded end of the record, or that portion which forms the end after the reaming operation, will be protected by the mold against accidental injury during the handling of the same prior to the removal of the finished article from the mold. I have also determined that the said concave surface may be of such form as to entrap a portion of the air contained in the bore of the mold as the same descends into the molten material, in which case the air is permitted to escape through air-holes extending through the body of the mold-cap. I have also obtained good results by providing a second groove concentric with the first groove and separated therefrom by a partition which tapers to a comparatively sharp edge. I have also discovered that the concave surface should be perfectly smooth and highly polished and preferably nickel-plated and also that the mold-cap should be kept cool during the molding operation, as by providing the same with a water-jacket.

My invention consists in the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawing, which is a vertical section showing a mold supported in a mold-carrier and surrounded by a water-jacket in the usual manner and provided with a cap constructed in accordance with my invention.

In carrying out the process of Patent No. 683,615, above referred to, the usual practice is to provide a tubular mold 1, carrying upon its interior surface a negative copy of the sound-record which it is desired to duplicate. This mold is open at the bottom to permit the molten material used for forming the duplicate to enter the mold, the mold being supported by a suitable carrier or support 2, which is provided with a seat 3 for the lower end of the mold and an opening 4 to allow the molten material to enter the mold. A removable water-jacket 5 surrounds the mold in order to keep the same at a temperature considerably below that of the molten mixture. The parts thus described, speaking broadly, are well known in this art and form no part of my invention. The particular form of mold illustrated is believed to be

novel, however, and is described and claimed in an application of Edward L. Aiken, filed October 12, 1905, Serial No. 282,365.

The mold-cap 6 consists of a circular body of a size suitable to fit within the upper end of the mold 1 and close the same. The lower surface of this cap is provided with two circular grooves 7 and 8. A central opening 9 extends through the body of the cap. The outer surface of the groove 7 is so situated as to form a continuation of the interior surface of the mold 1. At the deepest portion of the groove 7 is a small V-shaped groove 9, and communicating with the said groove 9 are a large number of air-holes 10, which extend through the body of the cap 6. The grooves 7 and 8 are separated by a web or partition 11, whose lower edge is comparatively sharp and occupies substantially the same horizontal plane as the outer edge of the groove 7 and inner edge of the groove 8. The cap 6 may be constructed of any suitable metal or alloy, such as brass, and its entire lower surface is highly polished and nickel-plated, so as to present at all times a bright untarnished surface.

The cap 6 is provided with a curved rod 12, by which it may be conveniently handled. The cap 6 is also provided with a water-jacket 13, preferably integral therewith, and is supplied with water through a flexible tube 16 and an inlet-pipe 14, the water leaving the jacket through an exit-pipe 15 and flexible tube 17.

In molding a record with the apparatus shown the temperature of the wax and the duration of immersion of the mold will be such that the mold will receive upon its interior surface a coating of congealed wax 18. Upon removing the mold from the bath of molten material the said coating adheres to the mold, and as soon as the wax has cooled sufficiently the cap 6 may be removed by a longitudinal movement and the neck 19 of the molded article may be removed by giving it a slight twist, whereupon it breaks off generally at or near the point 20. The interior of the record is then reamed out by a properly-shaped knife while the wax is still soft, so that its interior surface assumes the

shape indicated by dotted lines 21. It will be noted that the line 21 falls just outside of the groove 9 and air-holes 10, so that any impression which may have been produced by these parts will not appear upon the finished article. Furthermore, that portion of the congealed wax from which the record is formed is entirely within the body of the mold, so as to be protected thereby at all stages of manufacture.

After the reaming operation the record may be removed from the mold in an entirely finished condition by cooling, thereby producing a relative contraction of the record with respect to the mold and then withdrawing the record from the mold by a longitudinal movement.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. The process of molding which consists in causing the molten material to rise and congeal in a layer upon the interior of a hollow coreless mold, entrapping the air nearest the wall of the mold and allowing it to escape through an air-passage, removing the mold with its congealed layer from the molten material and then reaming out the bore of said layer while soft, on a line falling without the position of the air-passage, substantially as set forth.

2. The process of molding which consists in causing the molten material to rise and congeal upon the interior of a tubular coreless mold, having an overhanging concave surface forming a continuation of the bore of the mold, removing the mold with its congealed layer from the molten material and then reaming out the bore of the layer while soft on a line which intersects the position of said concave surface at a point situated within the body of the mold, substantially as set forth.

This specification signed and witnessed this 27th day of June, 1906.

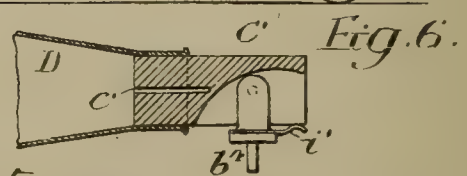
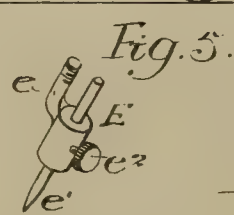
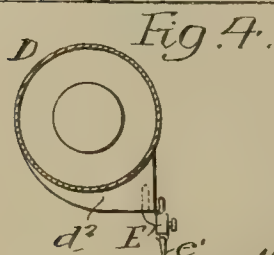
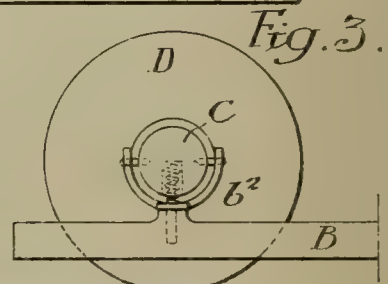
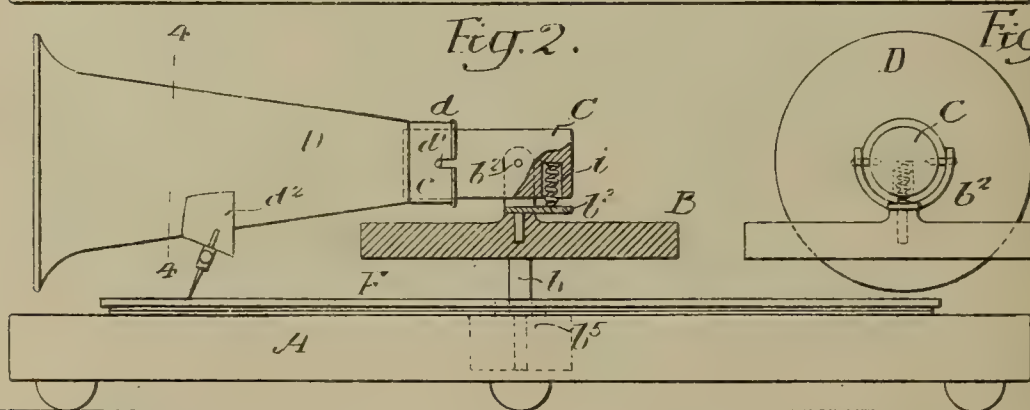
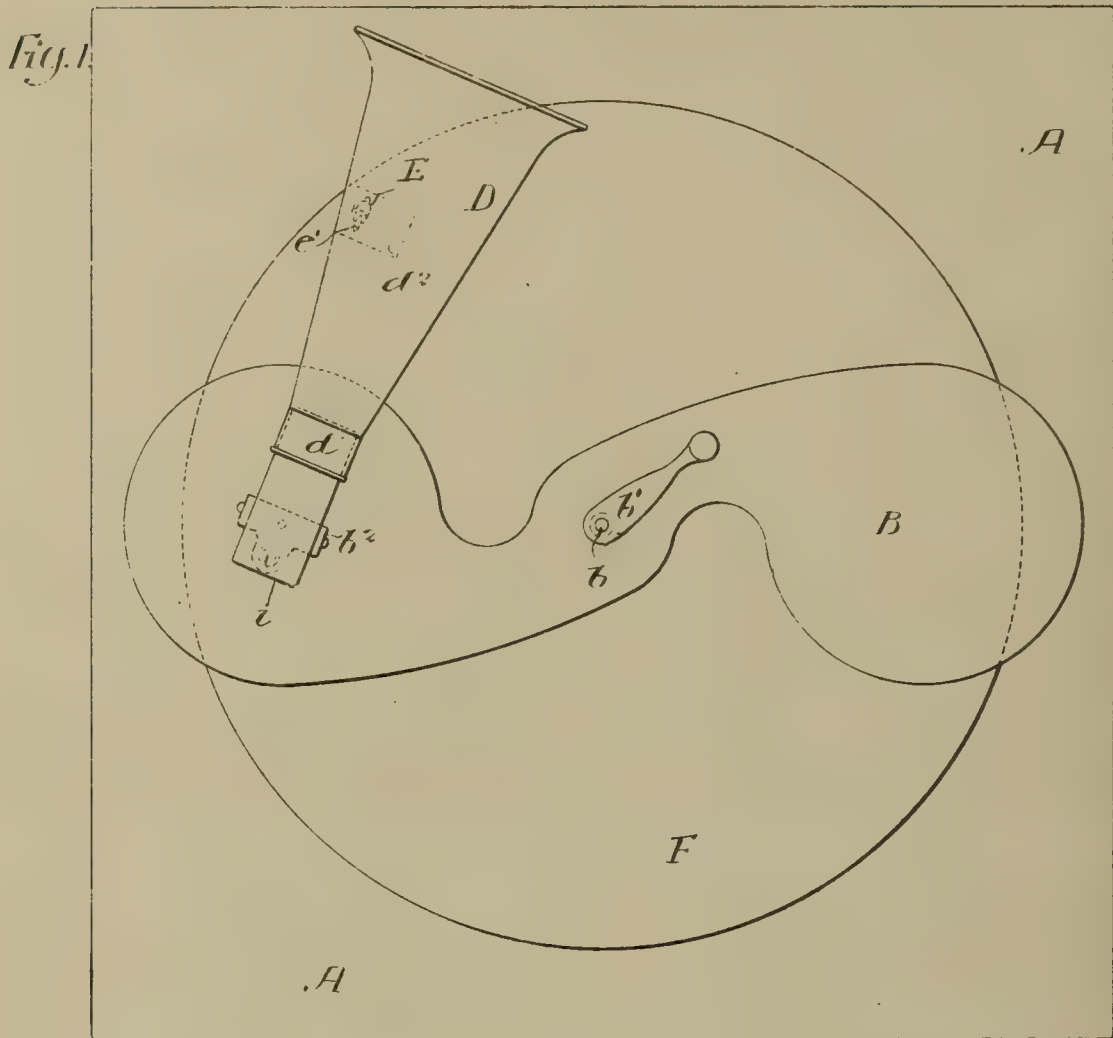
WILLIAM F. NEHR.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

E. T. PALMER.
TALKING MACHINE.

APPLICATION FILED AUG. 31, 1906.



Witnesses: { Will A. Burrows
Alvin H. Gross?

Inventor
Edward T. Palmer.
by his Attorneys
Howson + Howson

UNITED STATES PATENT OFFICE.

EDWARD T. PALMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO LOUIS I. MATTHEWS, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

No. 851,311.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed August 31, 1906, Serial No 332,729.

To all whom it may concern:

Be it known that I, EDWARD T. PALMER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Talking-Machines, of which the following is a specification.

One object of my invention is to provide a sound recording and reproducing machine in which the stylus and its supporting member shall be revolubly supported relatively to a stationary record, which may be of the ordinary disk type.

It is further desired to provide a device commonly known as a "talking machine," especially designed for use with records of the disk form, which shall have but few parts and these of a relatively simple and inexpensive nature. I also desire to produce a talking machine which shall require but little attention and be of such a nature as to not easily get out of order.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawing, in which:—

Figure 1, is a plan view of the machine made in accordance with my invention; Fig. 2, is a side elevation, partly in section, of the device shown in Fig. 1; Fig. 3, is an end view; Fig. 4, is a sectional view on the line 4—4, Fig. 2; Fig. 5, is a perspective view of the stylus; and Figs. 6 and 7, are views of a modification.

In the above drawing, A is a base or stand of any suitable form having at its center a bearing in which is removably supported a vertical spindle *b*. This spindle has at its upper end a crank *b'*, there being also fixed to it and extending in a substantially horizontal plane, a relatively heavy and preferably metallic plate B, which may advantageously be of the elongated shape shown in the figures, although I do not limit myself to such form. On one of the lobes of this plate is carried a U-shaped or forked piece *b²* movable on a vertical pivot.

A block C is pivoted to the arms of the U-shaped piece *b²*, as illustrated clearly in Figs. 2 and 3, and on the end of this block is secured the horn D, the horn in the present instance having a reduced portion *d* which passes over the end of the block C and is prevented from turning thereon by a pin *c* on the block which extends into a slot *d'* in the horn.

Directly secured to a projection *d²* on the

horn D is a stylus holder E; this holder E has a screw threaded arm which enters an opening in the projection *d²*, the stylus *e'* passes through the holder and is held in place by a set screw *e²*. The shape of the stylus holder may be modified if desired.

F is the record disk which is mounted on the base A, preferably on a sheet of felt or other soft material, as indicated in Fig. 2. The record disk is stationary and the horn with the stylus turn on the spindle *b* as a pivot.

Mounted between a projection *b³* and the block C is a coiled spring *i*, the spring entering a cavity in the block, as illustrated in Fig. 2. This spring tends to keep the stylus down onto the record, overcoming the centrifugal force due to the rotation of the metallic plate B which carries the horn and stylus.

It will be seen that there is a direct connection between the stylus and the horn, thus I dispense with an intermediate carrier.

In some instances the block C may be permanently secured to the horn D, but I preferably make it detachable, as shown.

In Figs. 6 and 7, I have illustrated a modification in which there is a saw kerf cut in the block C' into which projects a standard extending from the pivot plate *b⁴*. In Fig. 6, I have also shown a flat spring *i'* in place of the coiled spring illustrated in Fig. 2. The block C' in this instance is slotted at *c'* so that the end of the block will yield when the horn is forced over it, thus there is sufficient elasticity in the block to hold the horn rigidly in position without other fastenings.

When it is desired to operate the machine the spindle *b* with the plate B and its parts is removed from the base A, after which a record disk F is placed on said base concentric with the bearing *b⁵*, said spindle *b* and its attached parts are then replaced and the stylus *e'* permitted to rest upon the disk F. On revolving the plate B by turning the crank *b'* the stylus, which is carried by the horn, follows the spiral record groove in the disk, causing vibration of the horn which in turn causes sound waves to be produced. The sound waves are reproductions of the waves originally recorded on the disk, being due to the co-operation of the stylus and its parts with the record in the manner understood by those skilled in the art.

Owing to the fact that the forked support b^2 is free to move on a vertical pivot the horn D is free to move both vertically and horizontally so as to freely follow the spiral record groove from the periphery of the disk to a point adjacent to the center thereof.

Under operating conditions the records reproduced by this instrument are found to be clear as well as of suitable intensity, and it is obvious that the plate B can be turned at any desired speed to give a suitable reproduction of the record.

It is to be noted that the device has but few parts and even these are of the simplest and inexpensive construction.

In some instances any suitable device which will cause the sound waves to be reproduced can be used in place of the horn, although I prefer to use a horn in most instances.

I claim:—

1. The combination of a support, a stationary disk thereon, a revoluble member having turning means, a sound reproducer carried by said revoluble means, with a stylus mounted on said sound reproducer, substantially as described.

2. The combination of a support, a stationary record disk thereon, a revoluble member having a supporting spindle concentric with said disk, a sound reproducer on said member movable on a vertical pivot, and a stylus carried by said sound reproducer placed to engage the disk, substantially as described.

3. The combination of a support, a stationary disk thereon, a revoluble member having turning means, and a horn carried by said member, with a stylus on the horn, substantially as described.

4. The combination of a support, a stationary disk thereon, a revoluble member, a horn pivoted to said revoluble member, a stylus carried by the outer end of the horn and bearing directly on the disk, a spring tending to force the horn and its stylus towards the disk, substantially as described.

5. The combination of a support, a stationary disk thereon, a revoluble member having a supporting spindle concentric with the disk, a forked piece pivoted to the said member, a horn pivoted to the forked piece, a stylus carried by the horn, and a spring tending to force the stylus onto the record disk, substantially as described.

6. The combination of a support, a stationary disk thereon, a revoluble member having a supporting spindle concentric with the disk, a pivoted piece mounted on the revoluble member, a block pivoted to said

piece, a horn secured to the block, and a stylus carried by the horn, substantially as described.

7. The combination of a support, a stationary disk thereon, a revoluble member having a supporting spindle concentric with said disk, a piece pivoted to said member, a block pivoted to the said piece, a horn detachably secured to the block, and a stylus secured to the horn and bearing upon the record disk, substantially as described.

8. The combination of a support, a stationary disk thereon, a weighted revoluble member, a forked piece pivoted to said member, a block pivoted to the forks of said piece, a spring mounted between an extension of said piece and the rear portion of the block, a horn secured to the opposite end of the block, a stylus secured to a projection on the horn and bearing upon the record, substantially as described.

9. The combination of a support, a stationary disk thereon, a revoluble member, means for turning said member, a horn carried by said member, a stylus holder perforated for the passage of the stylus and having a screw threaded arm arranged to enter an opening in the projection on the horn, substantially as described.

10. The combination of a supporting structure having on it a relatively stationary record disk, with a reproducer removably mounted above said disk, and means for revolving said reproducer in a substantially horizontal plane, substantially as described.

11. The combination of a stationary record, a reproducer removably supported adjacent to said record, and means for revolving said reproducer, at any desired speed, with its stylus in engagement with the record, substantially as described.

12. A talking machine comprising a relatively fixed disc record, a reproducer movable to follow the record grooves in said disc, and a pivotal support for said reproducer in axial alignment with the axis of said disc.

13. A talking machine comprising a relatively fixed record disc, a support pivoted in axial alignment with the axis of said disc, and a reproducer supported by said support and movable around the axis of said record disc and toward and from the axis of said record disc to follow the record groove thereon.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD T. PALMER.

Witnesses:

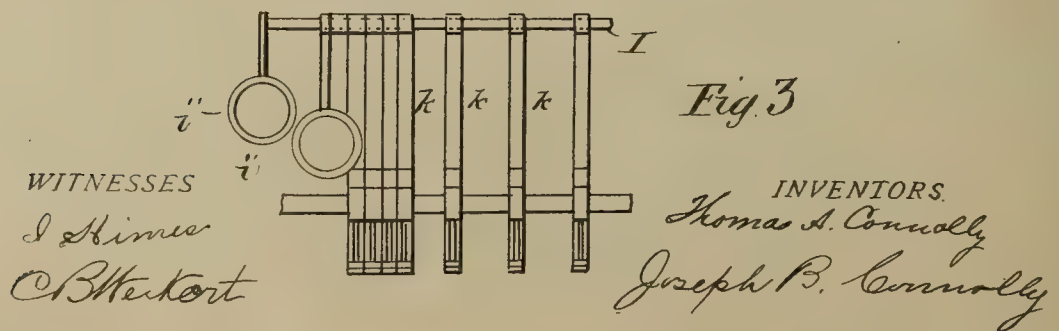
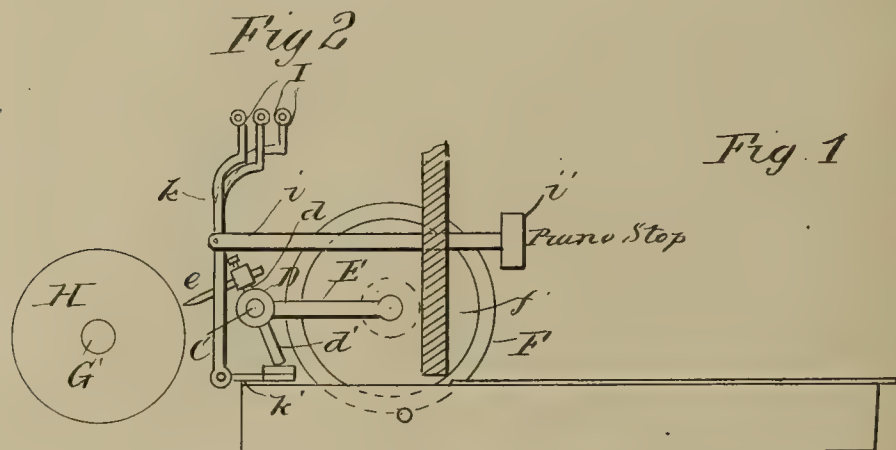
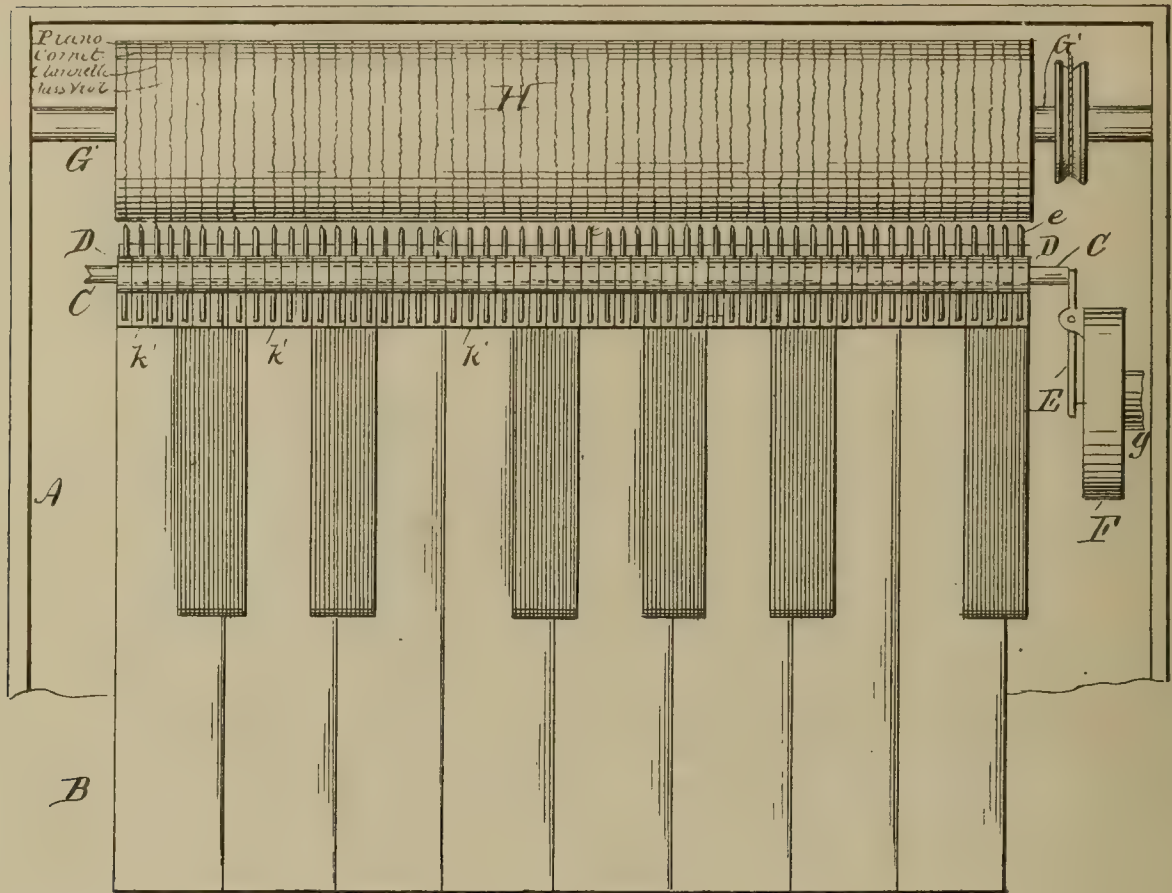
WILL. A. BARR,
JOS. H. KLEIN.

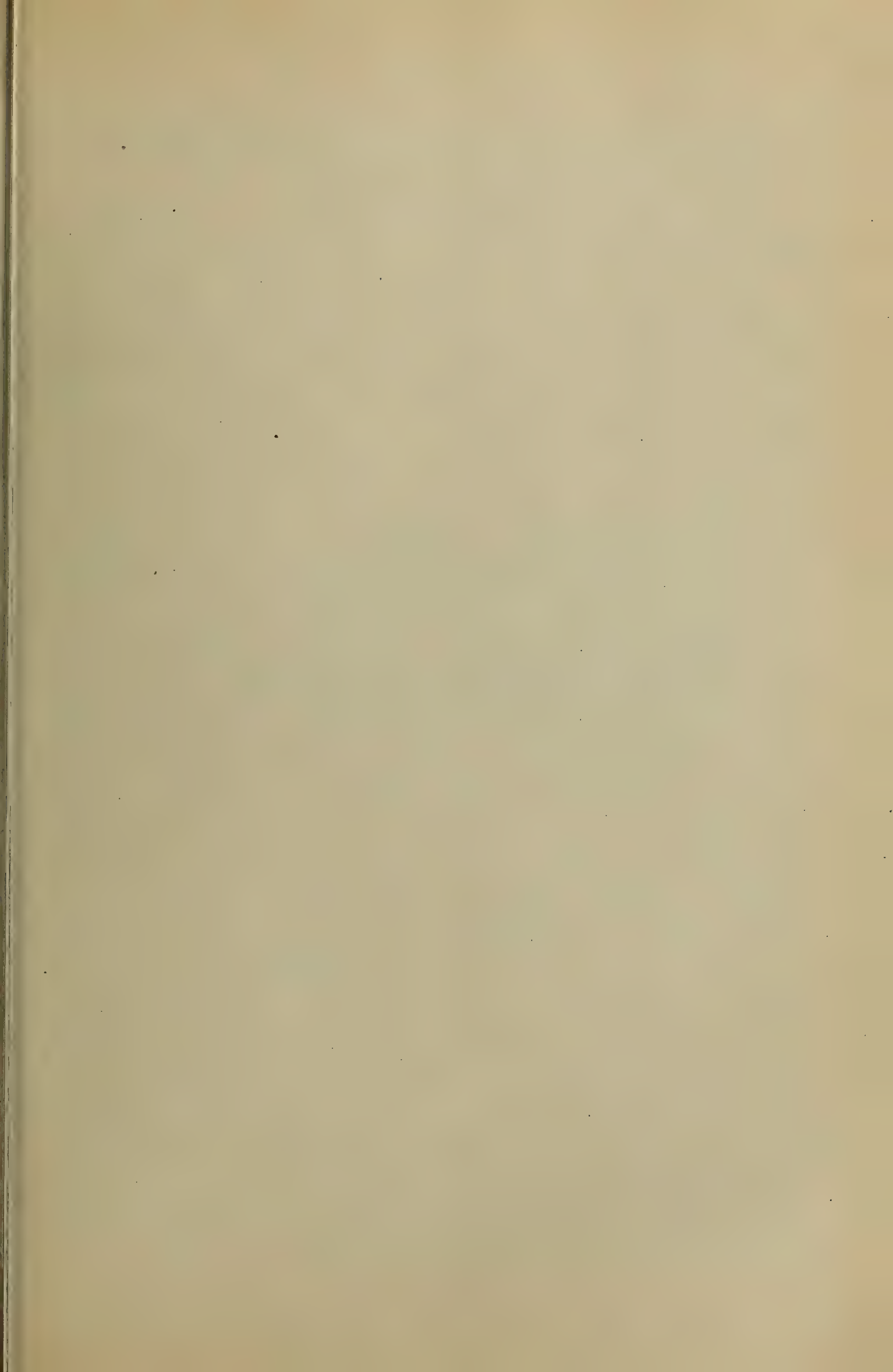
No. 851,634.

PATENTED APR. 23, 1907.

T. A. & J. B. CONNOLLY.
MUSICAL INSTRUMENT.
APPLICATION FILED JAN. 28, 1907.

2 SHEETS—SHEET 1.





No. 851,634.

PATENTED APR. 23, 1907.

T. A. & J. B. CONNOLLY.

MUSICAL INSTRUMENT.

APPLICATION FILED JAN. 28, 1907.

2 SHEETS—SHEET 2.

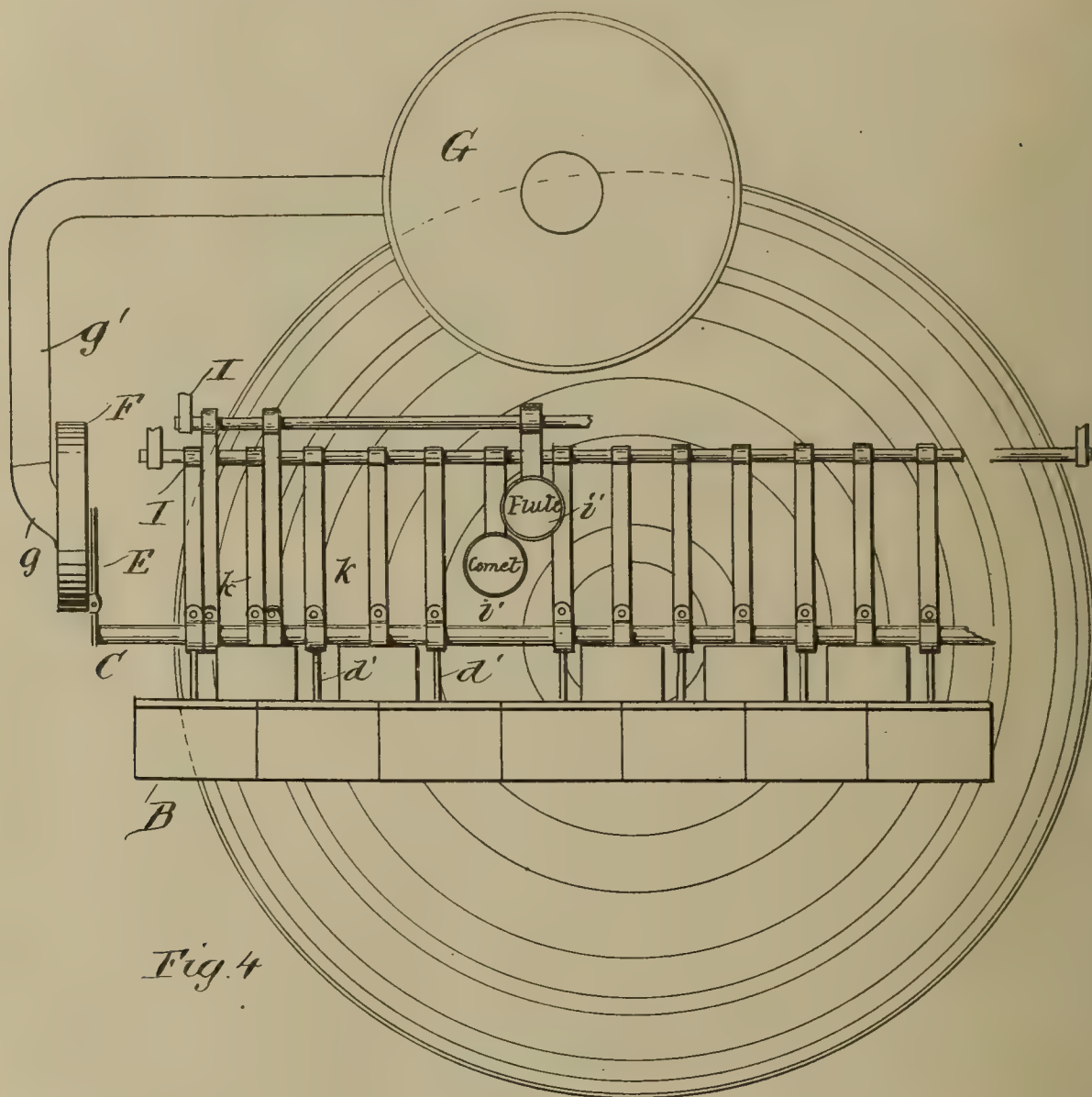


Fig. 4

WITNESSES

S. H. Miller.

C. H. Downing

Thomas A. Connolly
Joseph B. Connolly
INVENTORS

UNITED STATES PATENT OFFICE.

THOMAS A. CONNOLLY AND JOSEPH B. CONNOLLY, OF WASHINGTON,
DISTRICT OF COLUMBIA.

MUSICAL INSTRUMENT.

No. 851,634.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed January 28, 1907. Serial No. 354,485.

To all whom it may concern:

Be it known that we, THOMAS A. CONNOLLY and JOSEPH B. CONNOLLY, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

This invention has relation to musical instruments and has for its object the provision of an instrument, in which the principle of the phonograph or graphophone is applied to the production of the tones of the musical scale by the movement of keys, as in the piano forte, organ, or other key board instrument.

This invention has for its further object, the provision of an instrument, in which the tones of the musical scale represented by sound grooves or undulating lines, as in the phonograph or graphophone, may be produced or played either by hand, and according to the skill and taste of the performer or by automatic means.

This invention has for its further object, the provision of an instrument, embodying the principles of the phonograph or graphophone, whereby the tones of different kinds of musical instruments may be reproduced in any desired sequence or combination to produce melodies, airs, chords, harmonies or other musical effects, by manual performance on a key board or by devices, similar to those in use for the automatic playing of music on pianos, organs, and other key board instruments.

The instrument embodying our invention is preferably a key board instrument of the Clavier type, that is with the key board constructed and arranged as in the piano forte for the production of tone and semitone intervals according to the chromatic scale and the tone capacity compass or range may be of any desired extent. The tones or musical sounds are produced by the vibration of a diaphragm or diaphragms by a stylus or styluses operated by the undulations of sound grooves, or lines formed on a disk or disks, cylinder or cylinders, the appropriate stylus or needle for each tone being brought into operative relation to the proper tone groove by the depression of its corresponding key. The sound grooves, instead of being

spiral or volute are closed circles, each groove being adapted to produce a single note or tone and to continue sounding said note or tone so long as its stylus is in contact with it. In a tone scale-producing cylinder the sound grooves which are preferably those having lateral undulations, are located at regular intervals along the surface of the cylinder and the grooves for any given instrumental reproduction are at equal distances apart. The styluses or reproducing needles for all the different notes or tones are either mounted on a single sound transmitting rod or on different rods, the end or ends of which are in close contact with the lever or levers or a sound box or sound boxes, having suitable diaphragms, or said needles are carried respectively by vibratory levers mounted on separate sound boxes and accordingly as each stylus or needle for a given tone is operated by a different key from that of the others, any tone or combination of tones will be produced, according to the number and order in which the keys are struck. And if the sound grooves in the cylinder are all records of the same instrument, as for instance, a piano, the playing of the instrument as in playing a piano will produce the same tones as the piano. Moreover, if the cylinder have recorded on it, in the order of the musical scale, the tones of different instruments choral or orchestral effects are producible and the tones of any two or more instruments may be combined, "stops" being provided for bringing into requisition and eliminating the tones of the different instruments, as required.

In addition to the features above recited, provision is made for changing or transposing the key of the music so that any air or melody may be played in any desired key.

In the accompanying drawings; Figure 1 is a vertical transverse section of an instrument embodying our invention. Fig. 2, is a horizontal section or plan view. Figs. 3 and 4 are detail views, the latter being a modification.

A designates a casing or cabinet having the key board B, with the keys arranged in the usual order of white and black keys, representing, according to the conventional method, the tones and semitones of the chromatic scale. These keys are pivotally

mounted as in a piano or organ. Above the inner ends of the keys is arranged a horizontal rod C, on which are mounted, the levers D, having the arms d , d' , of which the arms d , carry the styluses or reproducing needles e . The rod C is arranged with its ends in contact with or attached to the lever E, of the sound box F, having diaphragm f' . The sound box is supported by the framing of the instrument, and has a tube g , leading from its rear side to a sound conveying tube g' , provided with a trumpet G.

H designates the sound reproducing cylinder mounted on an arbor G' , and preferably removable therefrom as in phonographs. The arbor G' is rotated by any suitable power, but, for the purposes of our invention, we prefer a pedal movement and suitable intermediate mechanism, including a speed governor, so that the power may be under the control of the performer on the instrument, as in operating the bellows of an organ or melodeon. Springs, weights or other automatic power mechanism may be used when desirable.

The sound grooves in the cylinder H are closed circles, and are produced in the original or master cylinder, by rotating the recording cylinder in a circle without longitudinal feeding during the operation of recording. Each groove is produced by the action of the stylus of a recording diaphragm, while the cylinder is making a single revolution during the vibration of the diaphragm under the influence of a single prolonged tone, and the several grooves are the records of the tones of the musical scale, in proper sequence. When the cylinder bears only the sound records of a single instrument, as of a piano, or organ, the grooves will be located at regular intervals corresponding to the distance between centers of keys. When the cylinder bears the record grooves of several different kinds of instruments, the grooves representing the same note or tone of the scale will be grouped side by side and the rod C will carry as many levers D as there are notes or tones. As each key is intended to produce, when struck, the same tone of each instrument represented on the cylinder, the tones are produced as required by means of "stops," the mechanism for which is similar to that employed in organs. A "stop" for our instrument may consist of a frame I with which is connected the rod i , leading to the front of the instrument and having a knob i' within easy reach of the performer as in an organ. This frame which is either adapted to slide or turn on pivots, is provided with a series of hangers k , located back of the inner ends of the keys, and having at their lower ends, tongues k' projecting forward and above the upper surface of the keys. These tongues are preferably pivoted to the hang-

ers. When a "stop" is not in use, the tongues k' are retracted, the knob and stem of the stop mechanism being pushed in so that the keys may be struck and their rear ends elevated without touching the stylus levers. When however a stop is drawn out, the tongues carried by its frame I are brought between the keys and the stylus lever and when the keys are struck, the tongues are raised thereby, and thus come in contact with and raise the downwardly extending arms d' of the levers D, thus turning the levers on the rod C and causing the reproducing needles carried thereby to enter the record grooves in the cylinder H, corresponding to the pulled stop. As the cylinder H is in constant rotation during the playing of the instrument, the tone produced by the depression of a key will in the production of some tones be prolonged while the key is held down. Very unique and strikingly novel musical effects however will be produced by prolonging the tones of certain instruments, hitherto unappreciable and in fact impossible, except as staccato tones, and when this prolongation of tones is desired the cylinder will bear sound grooves produced from the tones of percussion or plucked instruments, and stops will be provided which will prolong such tones as long as a key is held down.

In an instrument having an extended or full key board such as that of a piano or organ, it will not be necessary to provide the same compass for each system of tones. Thus the sound grooves for the cornet need only be sufficient to take in the usual compass of this instrument and its register may be the same as that of the cornet, in other words the system or arrangement will be similar to that of the organ.

Instead of using grooved cylinders, we may use one or more flat disks as shown in Fig. 3.

The instrument embodying our invention is adapted to the reproduction of any sounds capable of being resolved into a musical scale and therefore the tones producible by the human voice and recorded on the cylinders or disks may be reproduced as songs, airs or melodies without words.

Having described our invention, we claim and desire to secure by Letters Patent:

1. A sound reproducing instrument, comprising tone records of different instruments, constituting a plurality of scales of coincident register and means for reproducing from said records their respective tones, separately or in any musical relation.

2. A sound reproducing instrument comprising a series of tone records arranged in the order of the musical scale, and comprising a plurality of scales of coincident register and means for performing on said instrument and reproducing said tones according to the usual musical sequence and relation.

3. A sound reproducing instrument comprising records of the tones of a plurality of musical scales of coincident register and means for selecting and reproducing any individual tone or tone sequence or combination.

4. A sound reproducing instrument comprising records of separate musical tones grouped to form a plurality of scales of coincident register, a key board and means for reproducing tones by operating the keys on the instrument.

5. A sound reproducing instrument, comprising records of separate musical tones grouped in coincident scales, means for reproducing said tones, a key board through which said reproduction is controlled and means for coupling the reproducing means of each scale to a common key board.

6. A sound reproducing instrument, comprising records of the tones of a plurality of musical instruments of different quality or timbre, disposed respectively in the order or sequence of the musical scale, the tones of one scale coinciding in pitch or register with tones of another scale and means for reproducing any of the recorded tones.

7. A sound reproducing instrument, comprising records of the tones of different instruments, a key board through the medium of which the tones are reproduced at will, reproducing means controlled by said key board, and stops for bringing the different series of records and their reproducing de-

vices into responsive relation to the key board, and removing them therefrom.

8. A sound reproducing instrument, comprising sound records, a plurality of reproducing needles or styluses, a sound reproducing diaphragm, means for communicating the vibrations of the needles to the diaphragm, and means for bringing any needle in contact with its appropriate record line or groove.

9. In a musical instrument means comprising phonographic records and reproducing devices for simultaneously reproducing tones of a plurality of different musical instruments in unison.

10. A musical instrument comprising several scales of phonographic, single tone, records of different instruments, tones of one scale being reproducible in unison with tones of another scale.

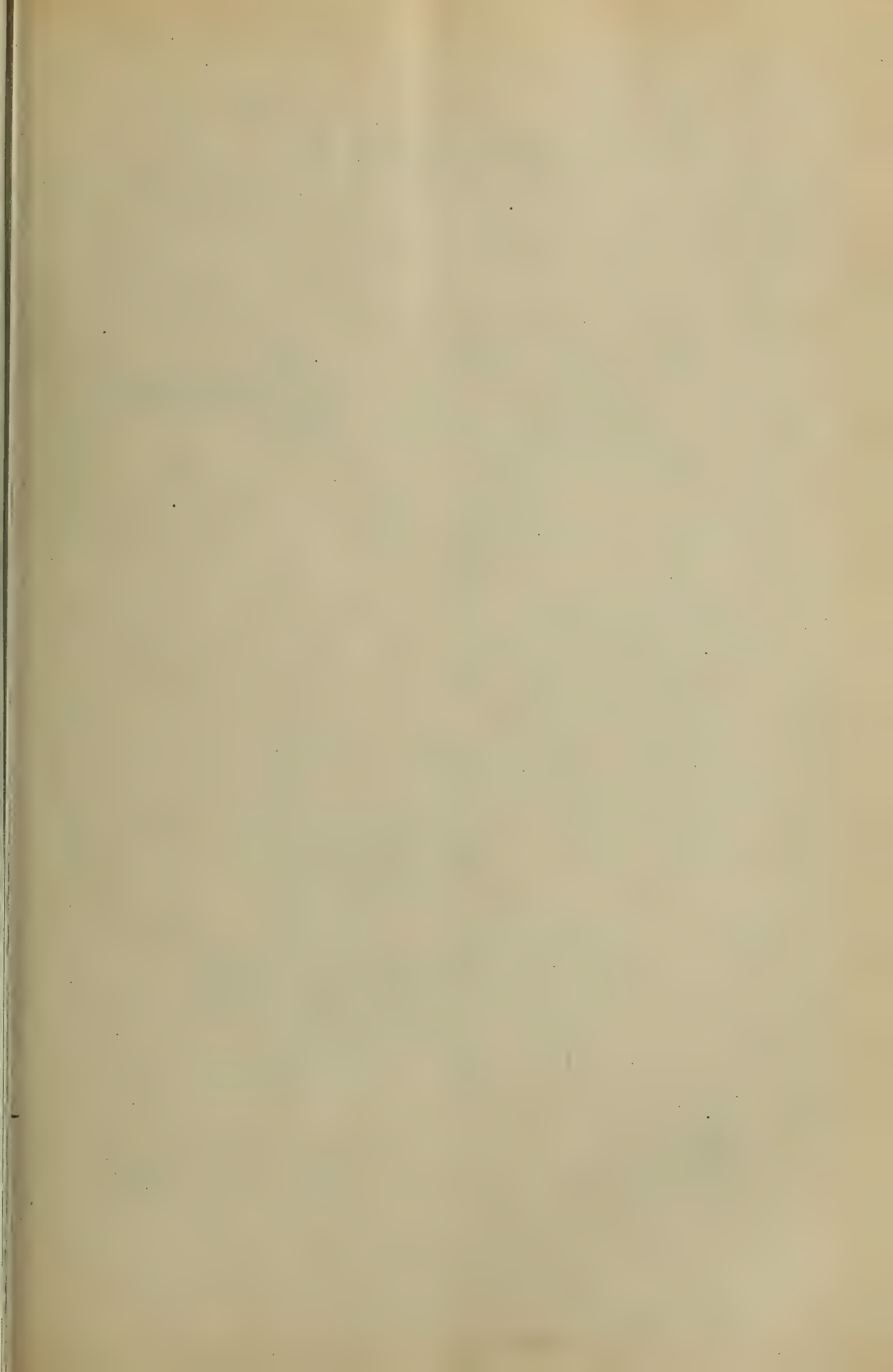
11. A musical instrument comprising several scales of phonographic, single tone, records of different instruments, tones of one scale being reproducible in unison with tones of another scale and means for bringing the different series of records into operation simultaneously or individually.

In testimony whereof we affix our signature, in presence of two witnesses.

THOMAS A. CONNOLLY.
JOSEPH B. CONNOLLY.

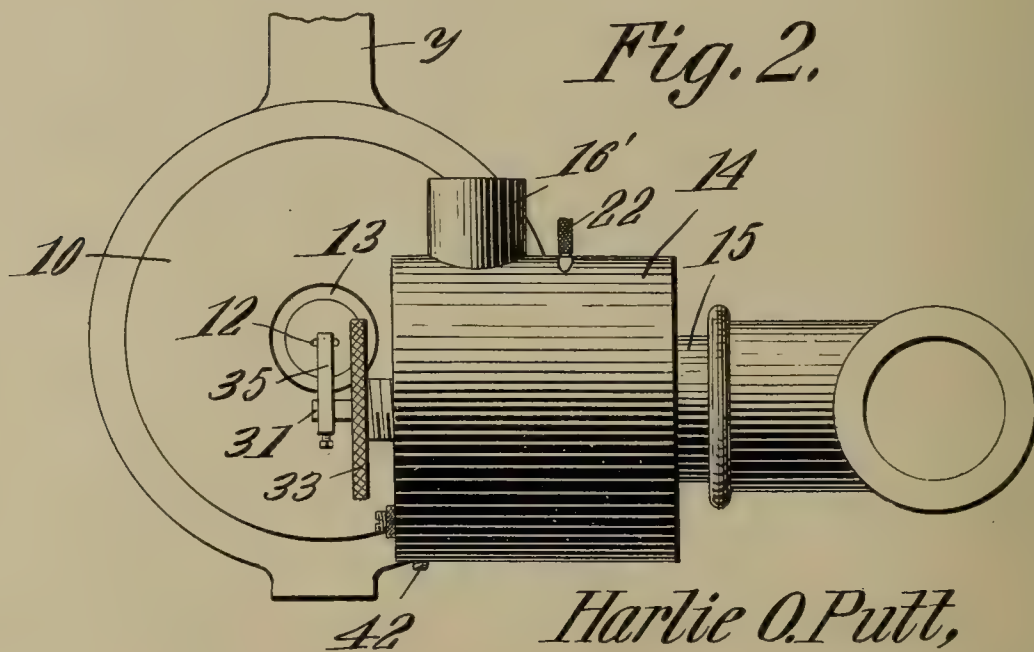
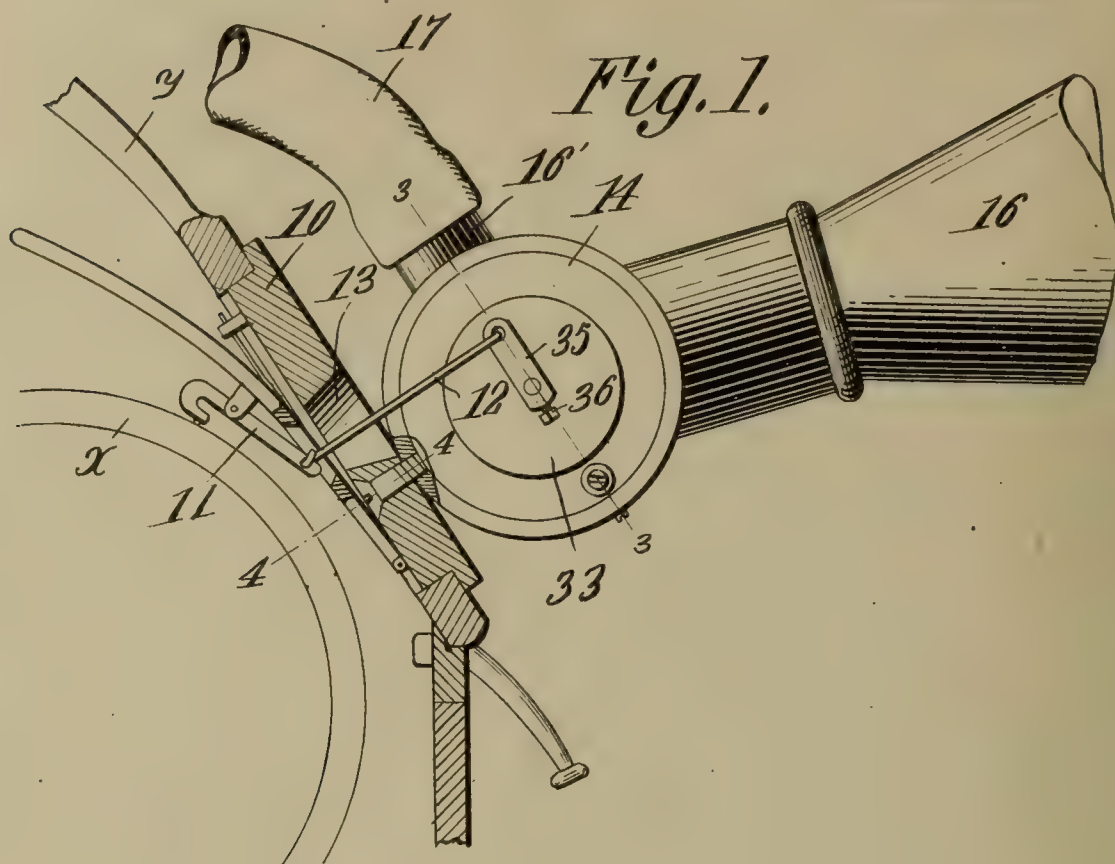
Witnesses:

CLYDE B. WEIKERT,
I. P. HIMES.



H. O. PUTT.
SOUND WAVE INTENSIFIER.
APPLICATION FILED OCT. 3, 1906.

2 SHEETS—SHEET 1.

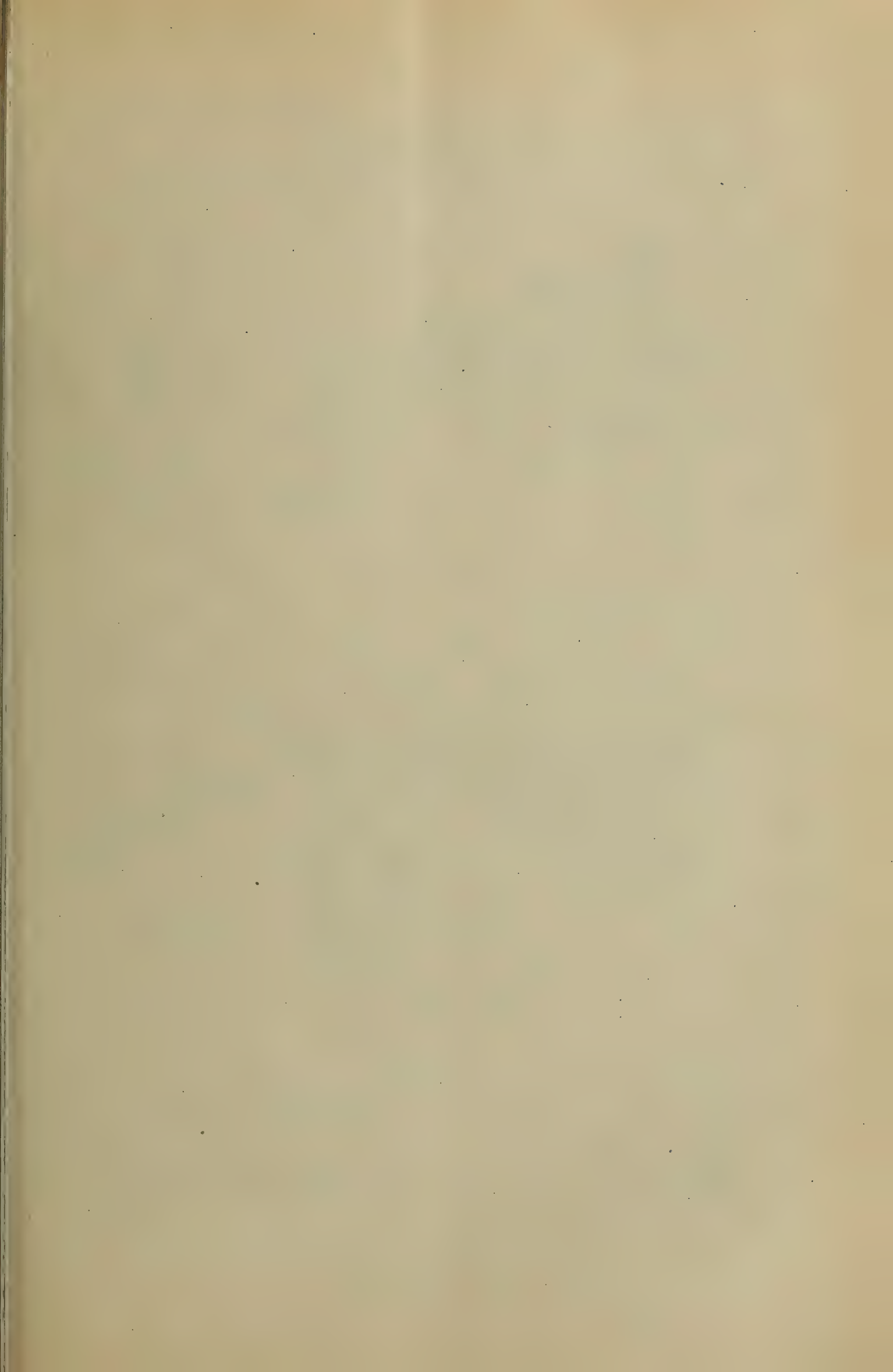


WITNESSES:

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J. M. E. Carter

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By *C. A. Snow & Co.*
ATTORNEYS



H. O. PUTT.
SOUND WAVE INTENSIFIER.
APPLICATION FILED OCT. 3, 1906.

2 SHEETS—SHEET 2.

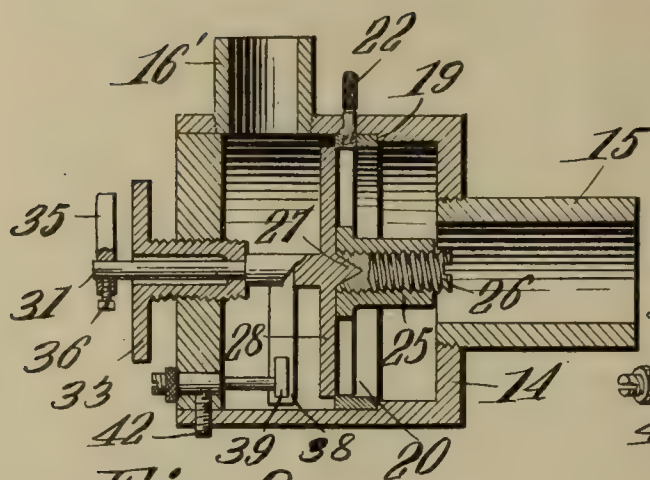


Fig. 3.

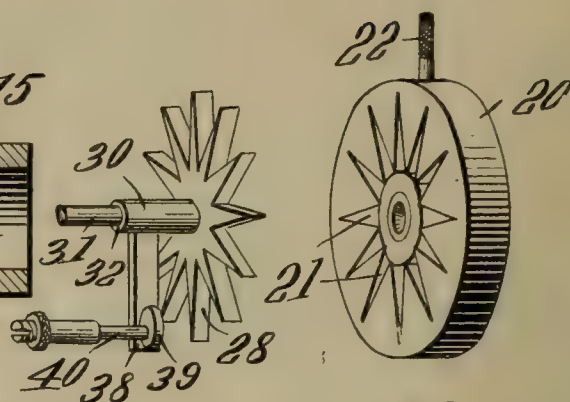


Fig. 5.

Fig. 6.

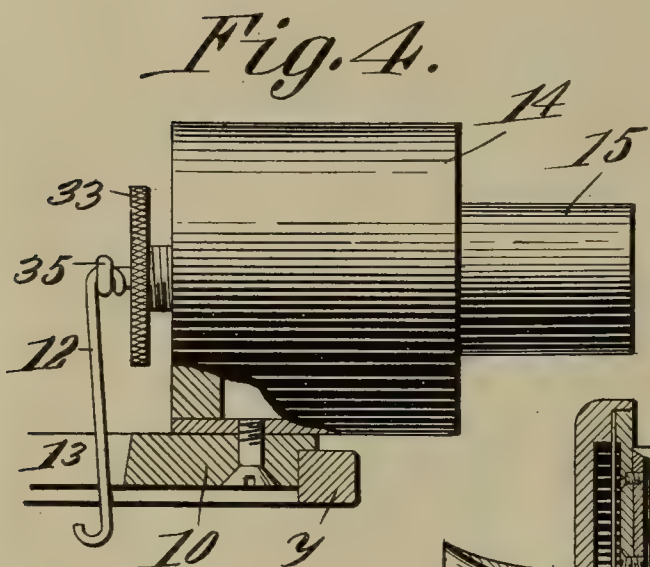


Fig. 4.

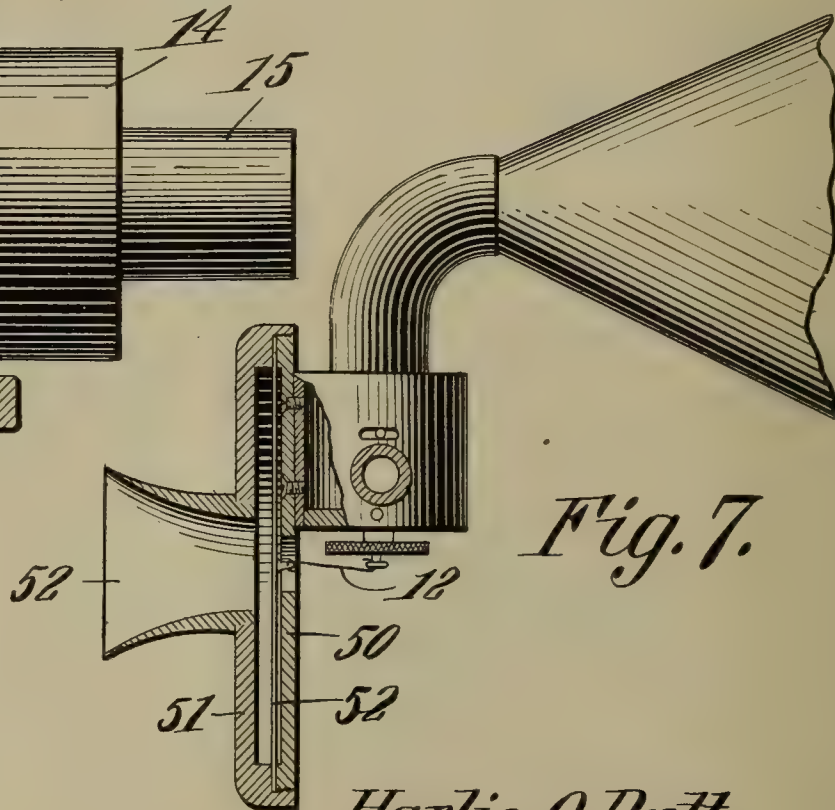


Fig. 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

HARLIE OGDEN PUTT, OF MILLBURY, OHIO.

SOUND-WAVE INTENSIFIER.

No. 852,615.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed October 3, 1906. Serial No. 337,272.

To all whom it may concern:

Be it known that I, HARLIE OGDEN PUTT, a citizen of the United States, residing at Millbury, in the county of Wood and State of Ohio, have invented a new and useful Sound-Wave Intensifier, of which the following is a specification.

This invention relates to sound reproducing apparatus, and has for its principal object to provide means whereby comparatively weak sound waves may be magnified, the invention being applicable to sound reproducing machines of the phonograph, graphophone or gramophone type, as well as to different forms of sound transmitting devices, such, for instance, of megaphones, speaking trumpets and the like.

A further object of the invention is to provide a mechanism whereby the comparatively feeble vibratory movement of a reproducing stylus or diaphragm may be employed to control the flow of a fluid under pressure in such manner that the fluid will follow precisely the movements of the stylus or diaphragm and produce sound waves of much greater intensity than would be possible where the reproducing means acts directly on atmospheric air at normal pressure.

A still further object of the invention is to provide a mechanism in which the flow of a body of fluid under pressure is controlled through the action of a sound wave record or directly by a diaphragm or other body receiving motion from sound waves.

A still further object of the invention is to provide a sound wave magnifying apparatus in which numerous short blasts of a fluid under pressure may be directed against the atmospheric air, the duration and intensity of the blast being under the control of the reproducing stylus of a phonograph or like machine, or under the control of a diaphragm or other body that is operated by sound waves.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from

the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is an elevation, partly in section, of a sound reproducing and magnifying apparatus constructed in accordance with the invention, showing the application of the same to a cylindrical record sound reproducing machine. Fig. 2 is a front elevation of the same. Fig. 3 is a sectional elevation of the device on the line 3—3 of Fig. 1. Fig. 4 is an elevation of the device, partly in section on the line 4—4 of Fig. 1. Fig. 5 is a detail perspective view of the valve which is actuated by the reproducing stylus. Fig. 6 is a similar view of the valve seat. Fig. 7 is a view, partly in section, illustrating the application of the invention to a megaphone or trumpet.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In Fig. 1 is shown a portion of a record *x* of a sound reproducing machine, and a portion of a sound box carriage *y*, the sound box and all of its parts being eliminated. To the sound box carriage is secured a disk 10, which serves to support a stylus 11 which may be of the usual construction, and mounted in the usual manner. One end of the stylus bears on the record, and the other end is connected by a link 12 to the apparatus for controlling the flow of the fluid under pressure, said link extending through a suitable opening 13 formed in the disk. Secured to the disk is a cylindrical casing 14 which is provided at one end with a short tube 15 for the reception of a trumpet 16 or other device by which the sound waves are to be carried off, and at one side of the casing is a nipple 16' which may be connected by a flexible tube 17 to a suitable source of supply of air, gas, or other fluid under pressure, this fluid entering the casing through the nipple 16', and passing outward through the connection 15, and this flow being governed by the sound record.

The interior of the casing is provided with an annular shoulder 19 on which is supported a valve seat 20, the latter being in the form of a disk that is provided with a large number of radial openings 21 that may be of any desired shape, the preferred form being that illustrated in Fig. 6, and extending from the

periphery of this disk is a lever 22 that projects through a slot formed in the periphery of the casing in order to permit circumferential adjustment of said disk. At the center of the disk is an elongated hub 25 having a threaded opening for the reception of a bearing screw 26 having at one end a conical opening for the reception of a cone 27 projecting from one side of a valve disk 28, the latter being provided with radially extending arms of a shape similar to that of the openings 21 in the disk 20, and so arranged that in one position of the valve, all of the openings 21 will be entirely closed. Projecting from the opposite side of the valve disk 28 is a spindle 30 having a reduced end portion 31, and provided with a shoulder 32 against which bears the inner end of a manually adjustable screw 33 that is adapted to a threaded opening formed in the end of the cylindrical casing 14, this screw and the screw 26 forming bearings which may be very accurately adjusted for the purpose of bringing the two valve disks very closely together, without, however, bringing them into such frictional contact as might interfere with free movement of the disk 28. To the outer end of the reduced portion of the spindle 31 is secured a rocker arm 35 to which the link 12 is connected. The rocker arm is held in place by a set screw 36 which permits of circumferential adjustment of the rocker arms to suit the position of the apparatus. Projecting from the valve spindle 30 is a spring arm 38 which is engaged by a cam 39 carried at the inner end of a small shaft or arbor 40 which may be adjusted circumferentially in order to vary the stress exerted by the cam on the spring. The shaft is held in any position to which it may be adjusted by means of a small locking screw 42. This cam offers slight resistance to the movement of the valve 28 and keeps the reproducer stylus in intimate contact with the record.

In operation, the reproducer stylus will be vibrated as it comes into contact with the record, and this movement will be transmitted through the link 12 and rocker arm 35 to the valve spindle and valve 28, the latter being moved a distance proportioned to the depth of the groove in the record. The air under pressure supplied to the casing 14 through the connection 16 will then escape through the openings 21 in the valve disk 20, the quantity of air escaping and the duration or variation of flow being governed by the movement of the disk 28. The released fluid being under pressure, will impinge against the air under atmospheric pressure in that portion of the casing which is connected to the trumpet, and will set such air into vibration, producing sound waves which correspond in time and duration with those from

which the record was originally formed, but of much greater amplitude or increased force, and thus will travel a greater distance, and will be clearer and more distinct than waves which are produced through vibrations of a mechanical element, such, for instance, as the ordinary diaphragm.

In applying the invention to megaphones, speaking trumpets, and other instruments of like character, the mechanism is arranged as shown in Fig. 7, the cylinder, valves, trumpet and other parts remaining substantially the same as previously described.

The cylindrical casing in this case is attached to a perforated disk 50 that is secured to a casing 51 in which is arranged a diaphragm 52 connected by a link 12 to the valved rocker arm. The casing 51 is provided with a mouth piece 52, and by speaking, singing, or otherwise producing sound waves at the mouth piece, the diaphragm is set into vibration, and these movements are transmitted to the valve, the latter controlling the release of the fluid under pressure and producing sound waves of increased intensity in the trumpet or other device employed for conserving or reflecting the sound waves.

I claim:—

1. The combination with the stylus of a sound reproducing machine, of a casing having an inlet and an outlet for a fluid under pressure, a stationary valve disk arranged within the casing and provided with radially arranged passages, a movable valve disk having radially disposed arms for closing said passages, a stem carrying the movable disk, means for connecting the stem to the stylus, and means for resisting movement of the stem by said stylus.

2. The combination with the stylus of a sound reproducing machine, of a casing having an inlet and an outlet, of a fluid under pressure, a ported stationary valve disk within the casing, a movable valve disk, a stem carrying the same, a pair of adjustable bearings for said stem, an adjustable rocker arm carried by the stem, means for connecting the rocker arm to the stylus, a spring arm extending from the stem, and an adjustable cam bearing against said spring arm.

3. The combination with the stylus of a sound reproducing machine, of a casing having an inlet and an outlet for a fluid under pressure, a circumferentially adjustable ported valve disk seated within the casing and provided with an internally threaded hub, a bearing screw mounted in said hub, a movable valve disk, a stem carrying the same and having at one end a conical bearing seated in the screw, the opposite end of said screw being reduced in diameter to form a shoulder, a second bearing screw resting against the

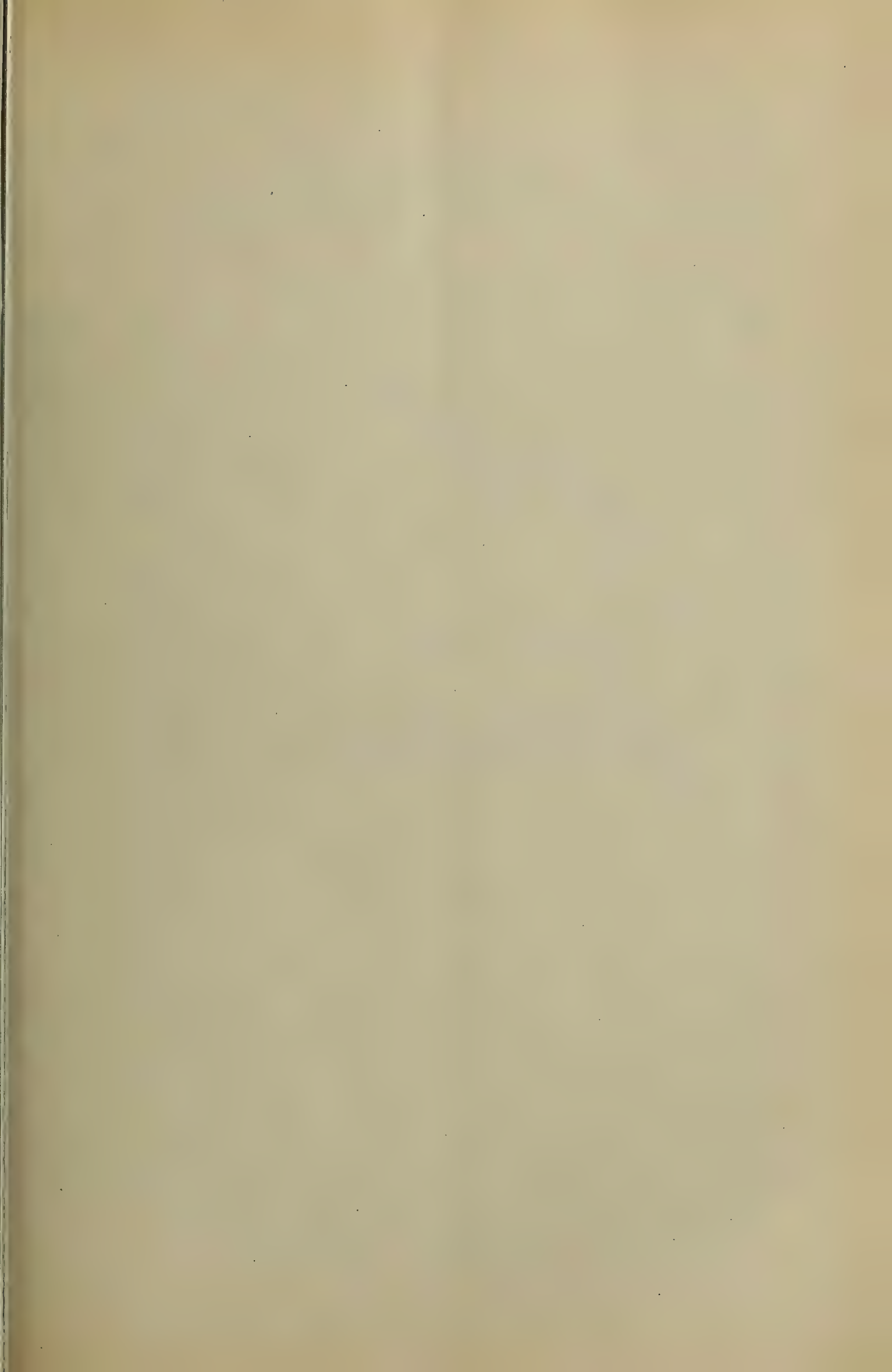
5 shoulder, a rocker arm adjustably secured to the reduced end of the stem, a link connecting the rocker arm to the stylus, a spring arm projecting from the stem, a cam arranged to bear against said arm, an adjustable arbor, or shaft carrying said cam, and a set screw for locking said arbor or shaft in adjusted position.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature 10 in the presence of two witnesses:

HARLIE OGDEN PUTT.

Witnesses:

DANIEL H. JAMES,
FOREST E. WALKER.



No. 852,646.

PATENTED MAY 7, 1907

L. I. BLAKE.
SYSTEM OF SUBMARINE SIGNALING.
APPLICATION FILED NOV. 11, 1906.

Fig. 1

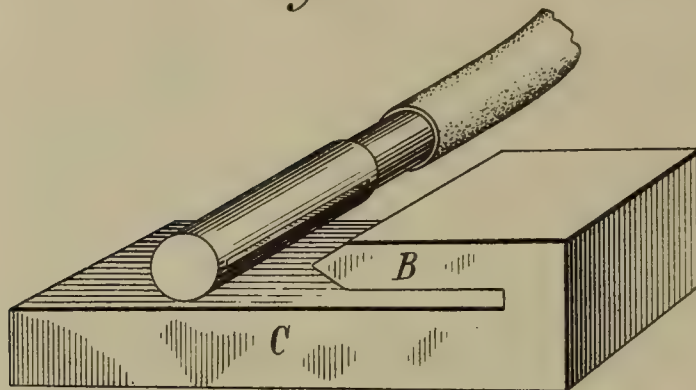
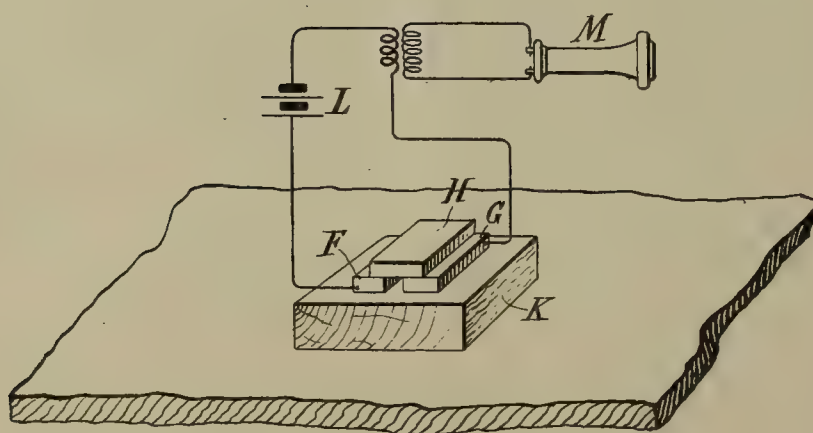


Fig. 2



Fig. 3



Witnesses
Thomas J. Byrnes
A. S. Dunham.

Lucien I. Blake Inventor
By his Attorneys
Kerr, Page & Cooper

UNITED STATES PATENT OFFICE.

LUCIEN I. BLAKE, OF LAWRENCE, KANSAS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

SYSTEM OF SUBMARINE SIGNALING.

No. 852,646.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed November 11, 1905. Serial No. 286,802.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Lawrence, in the county of Douglas and State of Kansas, have invented certain new and useful Improvements in Systems of Submarine Signaling, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In the art of sub-marine signaling, if this term be understood as including all methods of transmitting audible sounds or signals through a body of water, it has heretofore been customary, except when the conductivity of the water is relied upon to transmit electric current impulses, as described in my U. S. Patent No. 524,239 of August 7th, 1894, to produce the sound or signal to be transmitted by molar as distinguished from molecular vibrations, and to utilize the sound waves transmitted through the water to impart corresponding molar vibrations to a suitable receiver. In fact, in the art of submarine signaling as heretofore practiced substantially similar devices and methods of transmission are adopted as those employed in analogous transmission through the atmosphere, and approximately the same principles are followed as those which distinguish acoustic apparatus designed to operate in common air, a highly compressible medium and one without viscosity. I have made the discovery however, that much superior practical results are obtainable by the production, transmission and reception of molecular vibration, my investigations leading me to believe that the viscosity of the water, exerting an effect analogous to friction, impedes or annuls the mechanical vibrations of large amplitude which correspond to the lower segmental or molar tones, while permitting the high or molecular tones to be transmitted to great distances. Moreover water, unlike the atmosphere, is practically incompressible, and I have discovered that because of this property acoustic apparatus designed to operate molecularly when submerged is by far the most efficient and effective in coöperation with a medium naturally adapted to high molecular tones. The incompressibility of the water practically prevents or almost immediately dampens the

molar vibrations of any submerged sound-producing apparatus and thereby renders their repeated or continued production difficult and expensive. If, for instance, a sound device be forced to vibrate under water in molar segments, as has heretofore been accomplished by powerfully striking a bell pneumatically, the distance over which the fundamental tones can be practically transmitted and received is comparatively short. But I have demonstrated by practical tests that the molecular tones are transmitted and may be utilized to affect a suitably responsive receiver at very much greater distances, and are clearly audible for some time after the molar vibrations have ceased. This fundamental difference in the physical properties of water and air so far as acoustic properties are concerned, has not, so far as I am aware, been previously recognized or if so at all, only in a vague and incidental manner in the systems of submarine signaling by sound. Applying the principle underlying this discovery, I have succeeded in developing a system for the transmission of signals under water which yields results incomparably superior to those heretofore obtained by the use of instruments designed for the production and reception of molar vibrations, such system involving as its fundamental characteristics the employment of a transmitter adapted to set up within itself or to deliver into the water molecular vibrations, as distinguished from molar vibrations or disturbances, and a receiver sensitive to such molecular movements and capable of converting them into audible sounds.

In carrying out my discovery I have found it possible to use instruments or devices of widely different construction, and have found in practicing the method of imparting to the water molecular disturbances at one or more points and subjecting to their influence a receiver sensitive to such effects, that the ultimate results are entirely independent of the specific nature of the instrumentalities employed. I shall describe therefore, only such means as I have employed for demonstrating the principle of the invention and which I have thus far found to be the best for practical purposes, but it will be obvious from the above considerations that my invention is not limited to such devices, nor to

the specific manner of their use hereinafter set forth.

In the accompanying drawing Figure 1 is a perspective view of a sound producer or transmitter designed for use in carrying out my invention. Fig. 2 is a similar view of a different form of device for the same purpose. Fig. 3 is a form of receiver adapted for use in the system.

Referring to Fig. 1, the transmitter in this instance consists of an iron casting the weight of which may be say, seventy pounds. The casting is formed with a body C and a smaller overlapping portion B extending from the main body at its end but separated elsewhere by a slot of approximately one half inch wide.

The free end of the extension B is beveled, with faces at an angle of about sixty degrees, and at a distance from this end of about one inch is arranged a water pipe with a slot through which a thin jet of water under pressure may be directed against the beveled edge. If such a jet be forced against the end of part B, under a pressure say of eighty lbs., the whole device may be set in molecular vibration and when submerged in the water may be employed as a transmitter of my system.

The form of transmitter illustrated in Fig. 2 will serve to show how widely the construction of this device may be varied without departure from the invention. This transmitter consists essentially of a pipe of lead or other material about two inches in diameter through which a stream of water is forced through a flexible pipe P while submerged in the water. The end of the pipe near the inlet is formed with an opening like that in an ordinary tin whistle, and above this the pipe is partially closed except for a narrow slit S, through which the water is forced. When water is forced through the pipe R it splits in a thin stream on the beveled edge of the opening, and the water friction of this thin stream against the edge, and against the viscous water, sets the water inclosed within the short pipe into molecular vibrations which will be communicated as sound waves to the water outside. With an instrument of this kind a clear musical tone may be produced which does not depend for pitch upon the length of the pipe as in air instruments, where the air column vibrates segmentally.

The receiver shown in Fig. 3 is composed, essentially, of three carbon plates F, G, H, each about three inches long, two inches wide, and three sixteenths of an inch thick. Plates F and G are clamped or secured firmly to an oak base K, an inch or more in thickness, while plate H rests lightly upon and bridges the other two. When the instrument is used in a horizontal position no means for holding the plate H in place is required, but as in practice the base K is in-

tended to be cemented or otherwise united to a ship's skin on the inside below the waterline, a cover of wood lined with felt may be used to maintain the plate H in light contact with plates F, G.

The carbon plates are in circuit with a battery L, and the primary of an induction coil in the secondary circuit of which is an ordinary telephone receiver M, which may be in the pilot house or other convenient point on the ship.

If a transmitter such as shown in Figs. 1 and 2, be immersed in the water and set in molecular vibration, its vibrations will be transmitted for great distances through the water and may be caused to operate a receiver such as that described, so that the latter will emit a distinctly audible sound. The receiver as stated, may be attached to the skin of a ship, inside below the waterline, and I have found that it will be operated under such circumstances regardless of the character of the material in or the thickness of the sides of the ship. I am not able to state to what distances signals may be thus transmitted, but in practice I have had no difficulty in operating over a distance of four miles with apparatus such as above described.

I may observe that in some of the transmitters which I have constructed I have not had in view the complete suppression of molar or segmental vibrations, as the presence of these is or may not be detrimental to results which I seek to accomplish. Such vibrations, however, are of little or no utility as compared with the molecular vibrations as it may be readily demonstrated that they carry for only a fractional part of the time or of the distance over which the latter are effective to produce the most pronounced effects.

It will be seen that ships equipped with a transmitter and receiver of this kind may be able to communicate with one another, or with shore, over very considerable distances, and that the invention meets the requirements of a wireless telegraph system but at greatly reduced cost, and with much greater simplicity and economy of operation.

What I claim is:

1. The system of submarine signaling herein described, comprising in combination a submerged transmitter adapted for producing and imparting vibrations essentially molecular in character, and a submerged receiver sensitive to such vibrations, as set forth.

2. The system of submarine signaling herein described, comprising in combination a submerged body and means for setting up therein vibrations essentially molecular in character, and a submerged receiver sensitive to molecular vibrations, as set forth.

3. The system of submarine signaling herein described, comprising in combination a

submerged metallic body, means for setting the same in vibration essentially molecular in character, and a submerged receiver sensitive to molecular vibrations, as set forth.

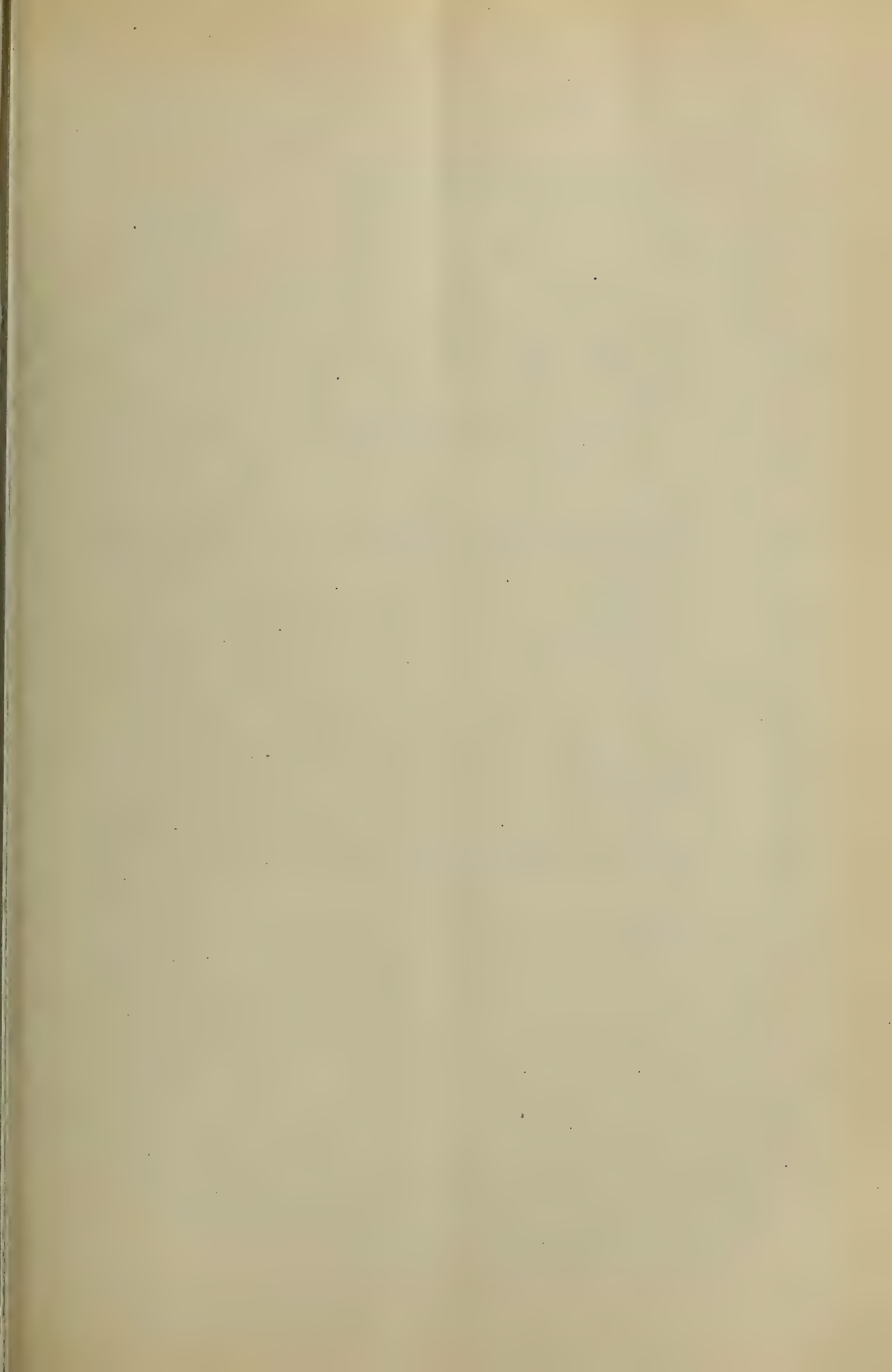
5 4. A transmitter for submarine signaling systems consisting of a metallic body in combination with means for setting the same in

vibration essentially molecular in character as herein set forth.

LUCIEN I. BLAKE.

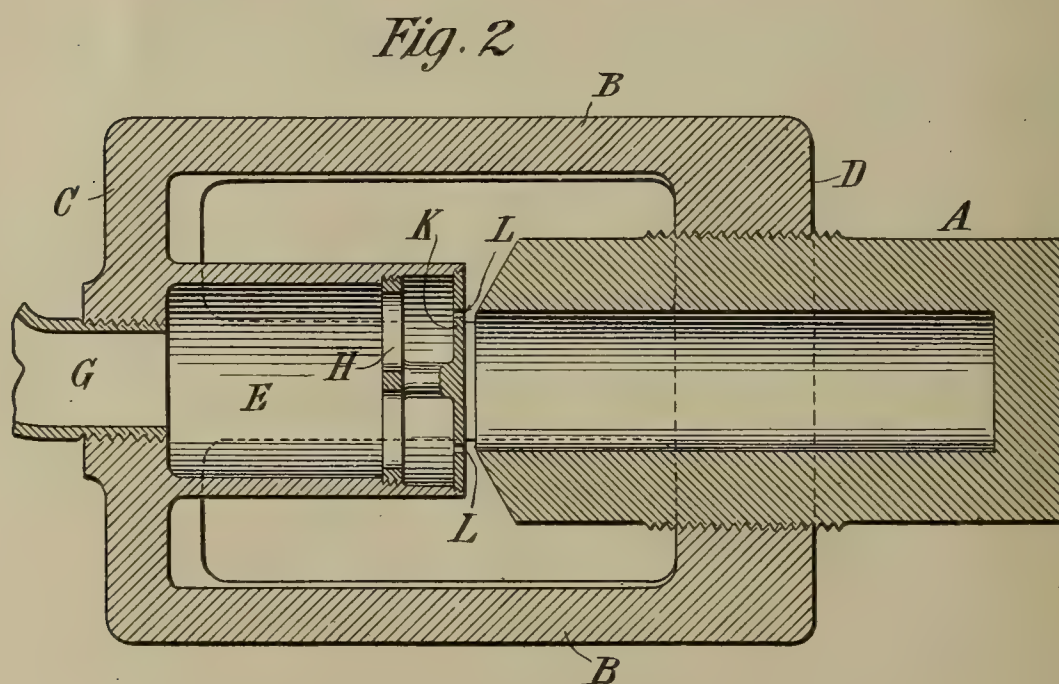
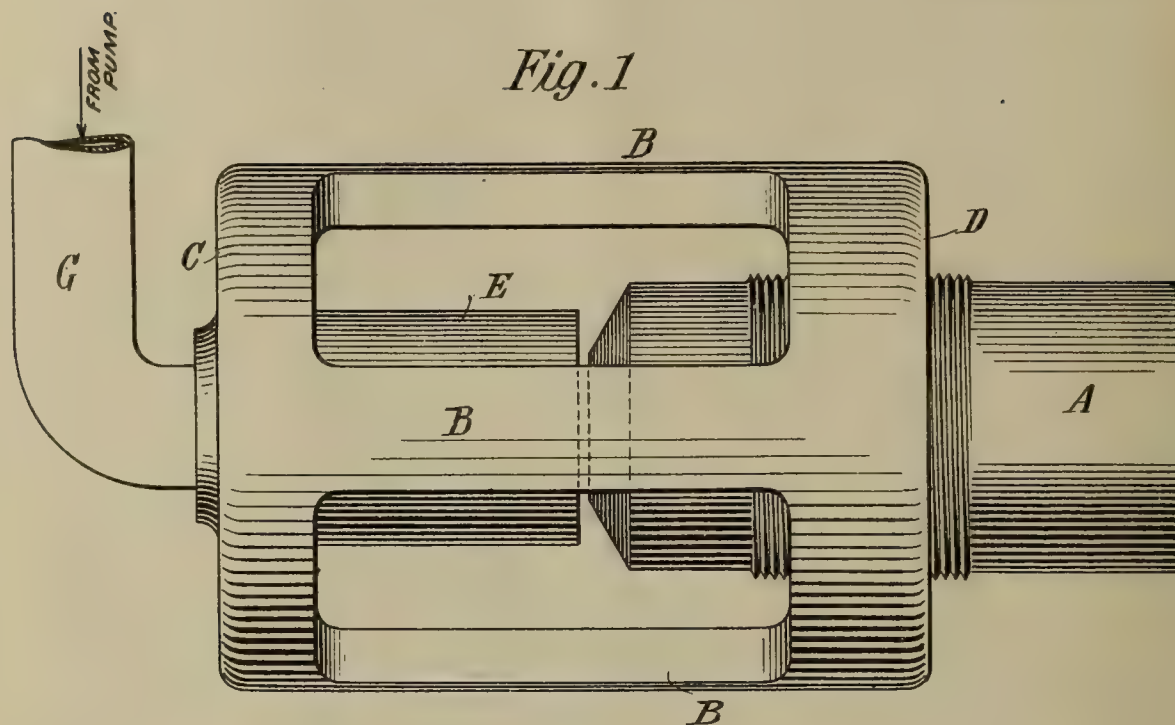
Witnesses:

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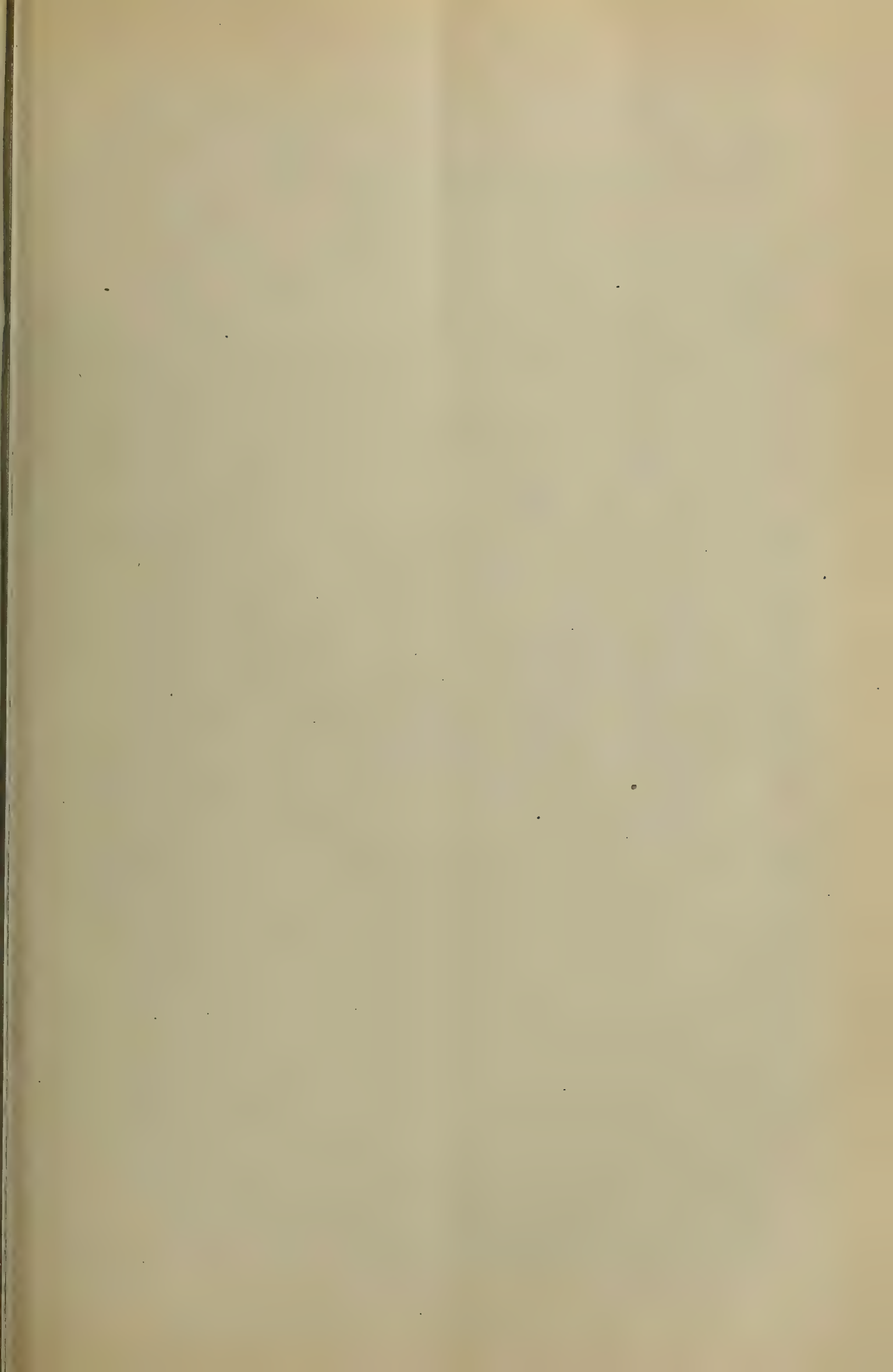
L. I. BLAKE.
SUBMARINE SIGNALING.
APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 1.



Witnesses
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S. Dunham.

Lucien I. Blake, Inventor
By his Attorneys
Kerr, Page & Cooper



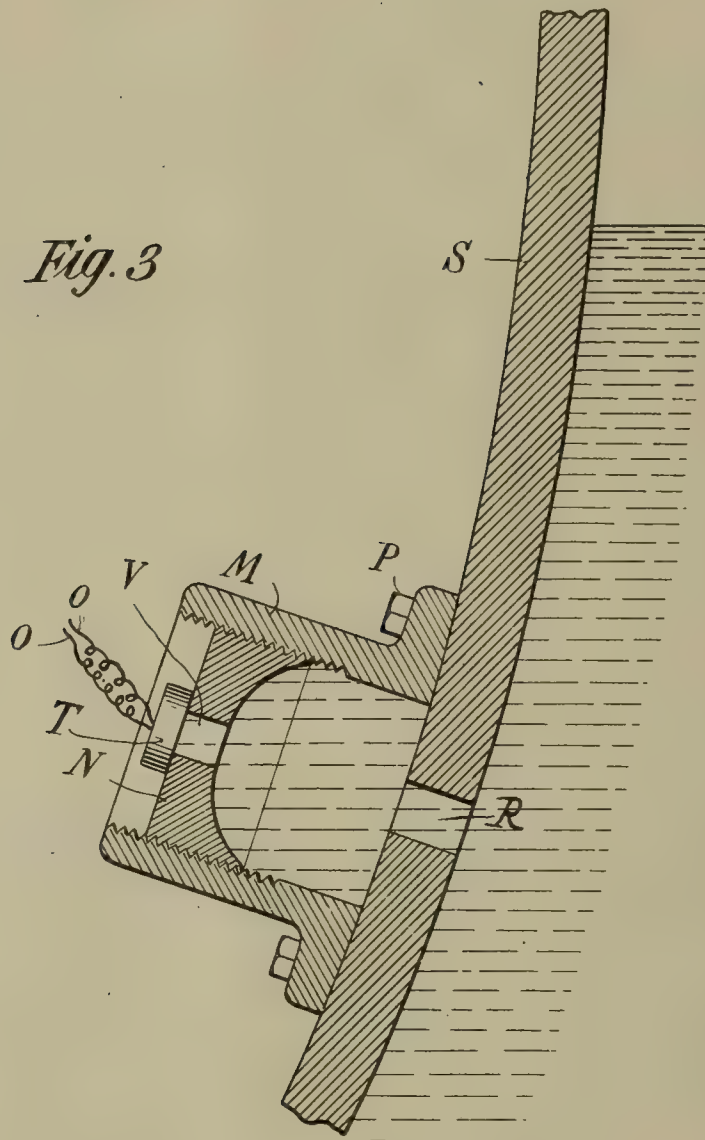
No. 852,647.

PATENTED MAY 7, 1907.

L. I. BLAKE.
SUBMARINE SIGNALING.
APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 2.

Fig. 3



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UNITED STATES PATENT OFFICE.

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SUBMARINE SIGNALING.

No. 852,647.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed January 8, 1907. Serial No 351,361.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Submarine Signaling, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

As an understanding of the nature of the invention upon which my present application is based, involves a knowledge of the phenomenon of resonance, the following statement of well recognized principles is apposite. The fundamental principle of acoustic resonance is reflection. In any portion of a gaseous medium which is isolated,—by which term as used herein is meant wholly or partially confined by boundary walls of any suitable material differing in its physical properties from the inclosed medium,—a reflection occurs at the surface of the boundary walls, of any acoustic disturbance present in that medium. This reflected disturbance will travel back and forth between the walls or boundaries to produce a tone of definite pitch, dependent upon the volume and shape of the medium inclosed. The chamber or cavity formed by the boundary walls is called a resonance cavity. The method of exciting a given medium to resonance is immaterial. It may be effected by sound vibrations brought into it from an outside and remote source, or by vibrations originating within the cavity itself. It is not necessary in any of the applications of the principle hereinafter described, or in general, that the cavity be entirely surrounded by reflecting walls, for an opening may be left in the latter through or at which vibrations may be imparted to the medium within the cavity, and another through which the regular periodic vibrations of the medium affected may be communicated to any other medium without the boundaries of the cavity. The function of the resonance cavity thus becomes a reinforcer of sound, whether received or produced.

In all aerial sound producers resonance chambers are the essential elements for giving intensity of sound. Their action is exemplified in the case of organ pipes and whis-

cles. In these the column of air inclosed within the walls of the resonance chamber is set into regular periodic or harmonic vibration at the embouchure by either the so-called flute mouth-piece or a reed. When the length of the air column is great in comparison with its other dimensions, as in the case of a pipe, the pitch is controlled by the period of travel of the disturbance from end to end of the pipe, and this is called the free period of the pipe. In the flute mouth-piece form a thin jet of air or steam impinges upon the sharp edge of an opening into the chamber and the rhythmic effect of friction produces a vibrating reed of air or steam which is continually controlled in its rate of vibration by the regular periodic vibrations of the column of air in the pipe.

In the case of the reed mouth-piece the reed is set in vibration by the air or steam impinging upon its unconfined edge, and the air or steam column sustains and reinforces these vibrations, controlling their rate and consequently the pitch of the tone if the reed be not too stiff. In either case the free vibration of the column within the pipe or chamber is the essential source of sound.

In connection with the consideration of the action or effect of these resonance cavities, it is important to bear in mind the distinction between the free vibration of the inclosed medium and the forced vibrations which occur in consonant materials excited by any source of sound. In the phenomenon of resonance, one definite pitch is conspicuous or natural for each given set of conditions, while in the case of consonance, sounds of any pitch are reinforced. In the former the size and shape of the mass of confined medium control in determining the pitch, the character of the containing walls, within certain limits hereinafter more fully explained, being immaterial provided they are capable of reflecting the disturbances; while in the latter, the physical character of the consonant body is the controlling consideration, size and shape being immaterial.

I have discovered and practically demonstrated that under proper conditions a liquid medium may be readily brought into sonorous resonance with a tone of given pitch, and that an isolated portion of liquid medium possesses, according to its dimensions, a cer-

tain musical pitch of its own. If, under such conditions, harmonic vibrations be set up within a body of liquid the latter may be caused to strongly reinforce these vibrations and consequently intensify the sound produced by them. Such a liquid mass will also reinforce sounds delivered into it from a distance, whereby weak tones will be rendered more audible, so that it may, therefore, be utilized, like an aerial resonator, both for the production and reception of sounds. Availing myself of this discovery, I have employed liquid resonators in systems of submarine signaling with results of a highly useful and novel character.

The desirability of securing the advantages of resonance for intensifying sound, either produced for transmission or received from a distant source, in the art of submarine signaling, has been recognized by those skilled in the art. As an abstract proposition it is, in fact, self suggestive from analogous results in the application of the same broad principle in the case of wind instruments, whistles, and in general those devices in which a sound of given pitch is reinforced by a resonating body of air or gas. No useful or practical application of the principle to submarine signaling, however, has ever been made, so far as I am aware, and for the reason, which my discovery has now rendered apparent, that conditions essential to the attainment of the resonance of isolated bodies of liquid, have not been recognized or secured in any apparatus that has been designed or proposed for use either as producers or receivers of sound under water.

In all wind instruments and other devices in which the resonance of a confined or isolated body of air is utilized, the resonating medium is of such a highly compressible nature in comparison with the materials ordinarily constituting its boundaries, that the latter may be of almost any rigid material, such as wood, paper or very thin metal. If, however, the medium which it is desired to set into resonance be a liquid, which is practically incompressible as compared with any gas, the rhythmic changes of pressure within it which correspond to sound, exert exceedingly powerful total pressures over the boundary walls of the chamber or cavity containing the liquid, according to the laws of hydrostatics. Such pressures, as is well known, may bend and even burst walls of ordinary strength. Therefore, if liquid resonators be constructed without due regard to the effect upon the retaining walls of these variations of hydrostatic pressure, they present conditions which actually remove the elements upon which reflection depends, but the effect of which is negligible when the medium is an easily compressible gas, such as air. It is for this reason that a water column in an ordinary organ pipe does not

produce resonance. This may be conclusively demonstrated by the following experiments: If a pipe 4 inches in cross sectional area and several feet long be made of hard metal, say $1/8$ of an inch thick, which would produce very much greater rigidity than would be required in any ordinary tone-producing instrument, and provided with an embouchure similar to that of an organ pipe, it may, if submerged in water, be operated to produce a tone by a jet of water in the same manner as an organ pipe is operated by air. It will be found, however, that the tone produced has a pitch wholly independent of the length of the pipe, thus showing that the water column is not set in resonance. The reason for this, as I have found, is that the rigidity of the walls is not sufficient to withstand the variations in hydrostatic pressure and thereby reflect the regular periodic or harmonic vibrations imparted to the mass of liquid within the pipe. If the walls of the pipe yield, then any change in the pressure originating at the embouchure of the inclosed liquid will be instantly relieved at that point, and therefore no change in pressure will be propagated through the pipe to undergo reflection, and thereby to produce resonance. In short, the liquid column remains quiescent at its normal pressure, and takes no part whatever in the production or reinforcement of sound. If the same pipe, however, be made of very hard and tough steel, with walls even more unyielding than the practically incompressible water surrounding them, it will be found to produce, when operated by a water jet in the same way, a tone of definite pitch that varies with the length of the pipe, thus proving that the liquid mass within the same is brought into resonance. To convey an idea of what is required in securing the proper character of inclosing walls for a liquid resonator, it may be stated that air is over twenty thousand times more compressible than water; and water over sixty times more compressible than hard steel, so that to secure the requisite rigidity of the walls in the case of a liquid resonator I have found it necessary to build them up by shrinking very tough steel tubes upon one another.

Applying the principle of the discovery that the boundary walls of the chamber or cavity for a liquid resonator must be of this special character in order to withstand the variations of hydrostatic pressure, and thereby produce the reflection characteristic of resonance, I have produced apparatus for use in systems of submarine signaling capable of intensifying sounds, both sent and received, and which possesses all the advantages in submarine work which distinguish similar devices for aerial sound-producing and signaling purposes, and which

have always been recognized and adopted as the most effective for fog signals, alarms and similar purposes.

In this specification, while I have illustrated the application of the principle of resonance to sound receivers as well as to sound producers for submarine systems; the description and specific claims relate mainly to the latter, as my improvements in sound receivers constructed in accordance with this principle, are illustrated and claimed more in detail in other applications.

Referring now to the accompanying drawings: Figure 1 is a view in elevation of a sound producer embodying my invention, showing the means for operating the same. Fig. 2 is a longitudinal cross section of the operative parts of the sound producer. Fig. 3 is a sectional view of a sound receiver.

Referring to Figs. 1 and 2, A is a cylinder of steel. It is shown as closed at one end with the other open and beveled on an angle of about 60 degrees to sharp edges. It is not necessary that the cylinder be closed, but, as will be understood, to secure the same free period of vibration of a column of liquid within it, an open cylinder must be of double the length. In practice I have found that for good results a cylinder designed for a given pitch and having a bore of 3 inches in diameter and 11 inches long should have walls 1—1/2 inches in thickness of very hard and tough steel built up by shrinking several tubes, one over the other. B, B, are side bars connecting the heads C, D, of a rigid frame. In the head C is secured, or integral with it is cast, a chamber E, provided with an inlet through which water is introduced by a pipe G from any suitable source capable of delivering it at a high pressure. Within the chamber E is a spider H carrying a plate K of slightly smaller diameter than an opening in the end of the chamber, and which therefore leaves an annular orifice L preferably of about 1/32 of an inch in width. In the head D is a circular opening with threaded walls with which corresponding threads on the exterior of the cylinder A engage. By this means the cylinder is rigidly supported with its beveled edge in proper position relative to the annular orifice L and with the capability of adjustment with respect thereto. The cylinder A is adjusted to bring its edge in close proximity to the annular orifice L, and is submerged at any desired point where the sounds or signals are to be produced. Water under pressure, preferably from 125 to 200 pounds, is then supplied to the chamber E, and issuing therefrom in the form of an annular jet impinges upon the edges and beveled end of the cylinder A, with the result that harmonic or regular periodic vibrations are set up in the column of water within the cylinder. These vibrations, owing to the unyielding character of the boundaries of the chamber or cavity in which

the column of water is contained are reflected back and forth from the walls and the column is therefore set in sonorous resonance. Such an apparatus will produce a tone of definite pitch dependent upon the dimensions of the chamber or cavity within the cylinder A. I have found that sounds thus produced will be carried to great distances through water and may be detected and rendered audible by suitable sound receiving instruments the more readily because of their distinctive musical character. By interrupting or varying the pressure of the water supplied to the chamber E, or by deflecting the jet issuing from the orifice in said chamber, distinctive signals, according to any prearranged code, may be sent by this device.

In Fig. 3 I have shown the application of my discovery to a device for receiving sound. S represents a portion of the skin of a steel vessel, which is selected for purposes of illustration. To the inner surface of the skin is secured, as by means of bolts P passing through flanges at its end, a steel cylinder M of the same character as that described in connection with Figs. 1 and 2. The opposite or inner end of the cylinder M is closed by a head N of corresponding thickness, the edges of which are threaded to engage with threads in the inner surface of the cylinder. A small orifice V is formed in the head N and an ordinary microphonic transmitter T is secured over the same so as to be operated by the resonance of the column of water contained in the cylinder M. Wires O, O connect the microphone with an ordinary telephone receiver. A small opening R may be drilled through the ship's skin in order to permit access of the water into the cylinder M, but this is not necessary for reasons previously described, as sounds coming through the water would be transmitted through the wall of the ship to the water column in the cylinder M, even were no passage of communication present. The head N, by means of its threaded connection with the cylinder M, may be adjusted to vary the dimensions of the chamber within the cylinder, and thus control the pitch of the resonant cavity in order to tune it to any desired source of sound. In this device the column of water within the cylinder M will be set in resonant vibration by a given sound transmitted to it through the water and entering either through the ship's wall or the opening R. The sound thus intensified operates the microphone, which produces in the telephone receiver an audible sound.

While I have described the invention by reference to specific forms of apparatus, it is evident that their construction may be greatly varied. In general, the sound producer may be submerged at any selected station or placed in a tank attached to the walls of a vessel. The receiver may be similarly

located so that by means of the apparatus signals may be transmitted from the shore to a vessel, or conversely, or between vessels within the limits of practical transmission.

5 What I now claim as my invention is:—

1. The improvement in the art of submarine signaling by sound, which consists in intensifying the sounds produced or received by the resonance of an isolated mass of liquid, as set forth.

10 2. The improvement in the art of submarine signaling by sound, which consists in producing regular periodic or harmonic vibrations in an isolated body of liquid, and
15 producing by the resonance of such body intensified sounds, as set forth.

3. A liquid resonator consisting of a receptacle with walls capable of withstanding the variations of hydrostatic pressure accompanying regular periodic or harmonic vibrations set up in a body of liquid contained within the same, and reflecting the said vibrations to produce resonance, as set forth.

4. A liquid resonator comprising in combination a receptacle with walls capable of withstanding the variations of hydrostatic pressure accompanying regular periodic or harmonic vibrations set up in a body of liquid contained within the same, and reflecting
25 the said vibrations to produce resonance, and means for setting up such vibrations in the liquid, as set forth.

5. A sound-producer for submarine signaling, comprising a receptacle with walls
35 capable of withstanding the variations of hydrostatic pressure accompanying regular periodic vibrations in a body of liquid contained therein, and reflecting the same to produce resonance, and means for imparting
40 such vibrations to the liquid, as set forth.

6. A submarine sound producer, comprising in combination, a receptacle forming a resonating cavity for liquids, and a source of liquid under pressure for setting up harmonic vibrations in the column of liquid within the
45 said cavity, as set forth.

7. A submarine sound producer, comprising, in combination, a receptacle forming a resonating cavity for liquids, a source of liquid under pressure and a nozzle adapted to
50 direct a jet of liquid so as to impinge upon the edges of such cavity, as set forth.

8. A submarine sound producer, comprising, in combination, a receptacle having an orifice with sharp edges and constituting a
55 resonating cavity, and means for causing a jet of liquid to impinge upon the edges for producing a rhythmic vibration of the liquid contained in the receptacle, as set forth.

9. In a sound producer for submarine signaling, the combination with a source of rhythmic vibrations, of a resonating cavity composed of a hollow cylinder with walls capable of withstanding the variations in hydrostatic pressure accompanying the vibrations imparted to the liquid contained
65 therein, and reflecting the same to produce resonance, as set forth.

10. In a sound producer for submarine signaling, a liquid resonator composed of a cylinder of hardened steel walls of a thickness capable of withstanding the variations in hydrostatic pressure accompanying the harmonic vibrations of a column of water contained within the cylinder, as set forth.

LUCIEN I. BLAKE.

Witnesses:

FULTON BLAKE,
J. CONVERSE GRAY.

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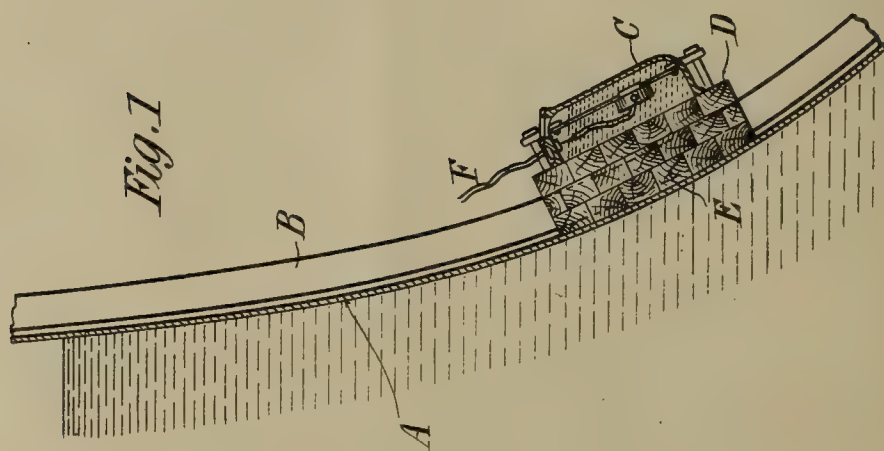
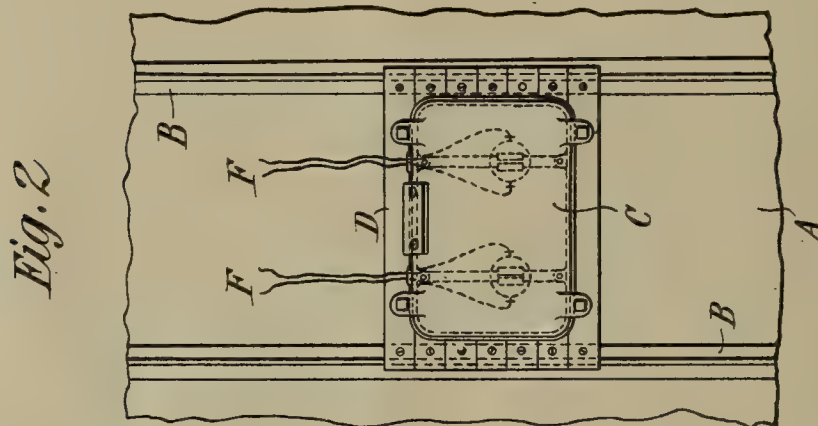
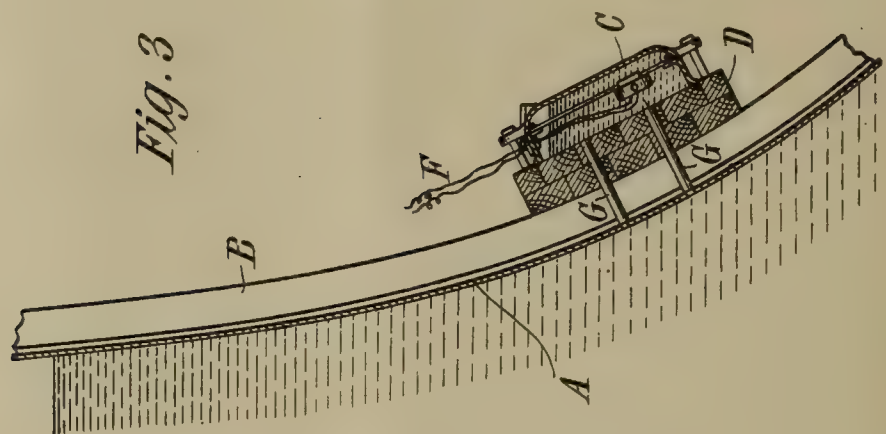
No. 852,648.

PATENTED MAY 7, 1907.

L. I. BLAKE.
ART OF SUBMARINE SIGNALING.

APPLICATION FILED JAN. 6, 1907.

2 SHEETS—SHEET 1.



Witnesses
Raphaël Better
S. Dunham.

Lucien I. Blake, Inventor
By his Attorneys,
Kerr Page & Cooper

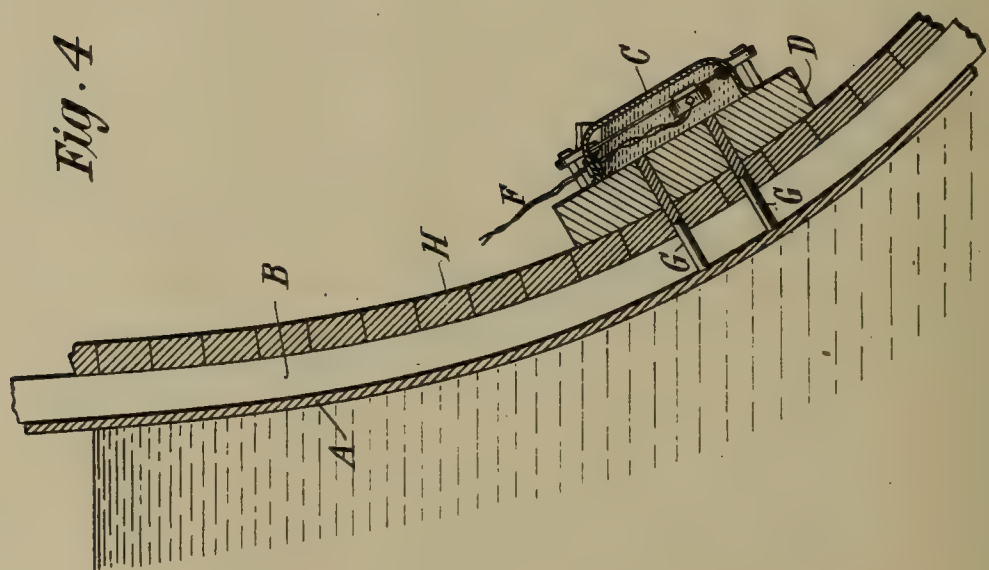
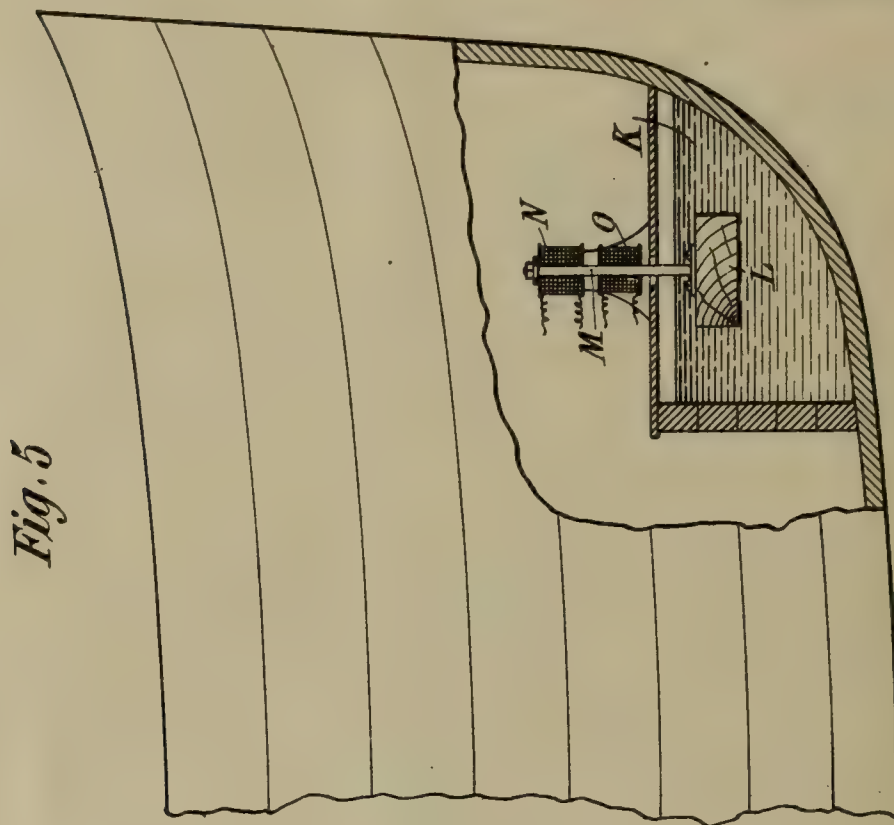
No. 852,648.

PATENTED MAY 7, 1907.

L. I. BLAKE.
ART OF SUBMARINE SIGNALING.

APPLICATION FILED JAN. 5, 1907.

2 SHEETS—SHEET 2.



Witnesses
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As Dunham

Lucien I. Blake, Inventor
By his Attorneys
Kerr, Page & Cooper

UNITED STATES PATENT OFFICE.

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ART OF SUBMARINE SIGNALING.

No. 852,648.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed January 5, 1907. Serial No. 350,983.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in the Art of Submarine Signaling, of which the following is a specification, reference being had to the drawings accompanying and forming a part
10 of the same.

In the art of submarine signaling, as heretofore practiced, by the propagation in the water of sound vibrations and their reception by submerged instruments sensitive to
15 such vibrations, it has been customary to inclose the sensitive devices in suitable casings under water, either over the side of a vessel or in a tank or suitable receptacle in the hold, and composed in part of the walls
20 of the vessel, or to attach them directly to the inner face of the skin or wall of the vessel below the water line.

As the first named plan requires that the casing containing the device sensitive to the sound vibrations be attached to the outside
25 hull of the vessel or float after it, it is seldom resorted to on account of the very obvious objections to either expedient. On the other hand, if the sensitive device be applied
30 directly to the inner wall or skin of the vessel, it has been found to be affected to an objectionable degree by the ship's noises, so that the procedure which has heretofore been found most practicable is to attach a tank or
35 water-tight receptacle directly against the inner wall of the ship, to fill it with water and immerse the sensitive instrument therein. In order to secure the best results, however, it has been found desirable to use tanks cover-
40 ing a comparatively large area of the inner wall of the vessel, and this has frequently necessitated the cutting away of portions of the ship's frame in order to expose sufficient surface of the wall. This is an expensive
45 and otherwise objectionable plan, and it was through attempts to obviate it that I was led to making the discovery upon which my present application is based.

Certain substances, chiefly of a fibrous
50 nature, such as woods, possess the property of consonance. Sonorous vibrations imparted to any limited portion of these substances cause their whole mass to be excited into

molecular vibrations of similar pitch. The consonant material becomes thus a second-
55 ary source of sound. It has no natural pitch of its own, as does a resonant cavity, as it is excited by a primary source of any pitch or quality, and its consonance does not depend upon its shape or size, but upon the
60 physical properties of the material of which it is composed.

Consonant materials are characterized by a cellular or fibrous structure and high molecular elasticity. Steel and glass, for
65 example, though highly elastic, are granular or crystalline, not cellular in molecular structure, and are not appreciably consonant. White pine wood, on the other hand, is highly
70 consonant.

Resonance as distinguished from consonance depends upon the shape and size of cavities, and upon the "free" vibrations of the medium within the cavities, and not upon the composition of the material which
75 bounds them. It is important to bear this distinction clearly in mind in order to arrive at a full understanding of my present invention.

This invention is based upon the use and
80 application in a novel manner of consonant material as a sound intensifier in submarine signaling. I have discovered that consonant material, because its action is essentially
85 molecular, is eminently fitted to receive sound from, and to deliver it into, water, in which medium the sound vibrations most useful for signaling are essentially molecular, and that for either purpose it acts as a powerful
90 reinforcer of sound.

In carrying out this invention I interpose between the water through which the sound vibrations are transmitted, and the source or receiver of sound, a body of consonant material directly associated in acoustic rela-
95 tion therewith. This may evidently be accomplished in a great many ways, but I shall illustrate herein only those which I have thus far, in my experimental investigations and practical tests, found to be the
100 most effective, and which may be generally described as follows:

For sending purposes a mass of consonant material is immersed in the water at any given station, whether on shore or in the
105 vicinity of a vessel, in which latter case it

may be immersed in the peak or other tank within the vessel, the walls of which tank are composed in part of the sides of the vessel itself. In either case the body of consonant material may be excited to powerful
5 consonance by any suitable primary sound producer, such as the stem of a power-operated reed or rod longitudinally excited by an electric current. In this case the con-
10 sonant substance becomes a secondary source of molecular vibrations which are delivered into the water.

For receiving purposes a body of consonant material is immersed in the water or
15 is attached to or forms part of the side of a vessel, or is immersed in a tank attached to such side and filled with water. The sensitive device which is usually an ordinary microphonic transmitter, but which for con-
20 venience, since it forms a part of the receiving apparatus, is referred to as a receiver, is immersed in the tank or attached directly to the consonant material, which greatly intensifies the sound received from the water
25 or through the ship's side and delivers it in greater volume and unimpaired quality either to the tank or to the receiver directly.

The specific ways of carrying out this invention so as to realize the advantages of the
30 property of consonant material which renders it capable of intensifying sounds either received from or transmitted to the water, will be illustrated in detail by reference to the accompanying drawings, in which,

35 Figure 1 is a sectional view of a portion of a ship's hull, a water tank containing a sensitive receiving device and a block or filler of consonant material forming one side of the tank and attached directly to the inner surface of
40 the skin of the ship. Fig. 2 is a plan view of the tank and portion of the ship's wall. Figs. 3 and 4 are similar views of modifications of the improvement. Fig. 5 illustrates an apparatus for transmitting signals through water
45 by the use of a consonant material.

Referring to Fig. 1, A designates the skin of an iron or steel ship and B the ribs. C is a tank such as is commonly used in this system and which is ordinarily secured below
50 the water line directly to the skin or wall of the vessel, which latter forms one of its sides. In the present instance, however, the tank is bolted to a block of consonant material D, consisting of a slab of white pine wood in
55 one piece or made up of a number of sections, as indicated in the drawing. This block forms one side of the tank and serves as a base for the same by means of which it is secured to the ribs B. The space intermediate to the inner surface of the skin and the
60 base block D is solidly filled with the same or similar consonant material E. Within the tank, and immersed in the water with which it is filled, is one or more microphonic transmitters in a circuit or circuits F, F, lead-

ing to a convenient part of the vessel and containing a telephone receiver which is not shown. The microphones or sensitive receivers may be supported within the tank
70 by attaching them to rubber bands stretched across the central part of the same. Any ordinary instruments of this class may be employed for the purpose, such as a granular carbon transmitter, inclosed so as to ex-
75 clude water, a Bell receiver either with or without the usual induction coils.

Sounds or signals such as are produced by a submerged bell, or other source of sound vibrations capable of being transmitted
80 through the water, are carried through the ship's skin to the body of consonant material which, being thus excited into vibrations of a similar pitch and greater amplitude, acts as an intensifier of the sounds which are taken
85 up and delivered by the sensitive instruments.

The principle involved in the use of consonant material above described may be carried out in a great variety of ways, it being
90 necessary, in general, to observe only such precautions as will bring in operative contact with the water, through which the sounds are transmitted or in contact with the skin of the vessel and preferably below the
95 water line, a body of consonant material which will be excited into molecular vibration by the transmitted sounds and operate thereby a suitable sensitive device, for receiving and rendering such sounds audible.
100 For example, as shown in Fig. 3, the tank C may be bolted to a slab or base of consonant material D, which may be secured to and over the ribs B of the vessel. Sound posts G, which I have made of consonant material,
105 but which may be of any material whose acoustic conductivity is suitable for the purpose, are driven through the base into contact with the skin A between the ribs to form
110 paths between the two for the transmission of the vibrations. In practice I have found the use of such sound posts to answer all practical requirements of a solid filler of consonant material.

In vessels provided with a wooden or other sheathing, such as shown at H in Fig. 4, substantially the same results may be secured by
115 bolting the consonant base or filler D to the sheathing, and driving sound posts G through both the base and the sheathing into contact with the skin of the vessel or in other ways
120 providing acoustic conductors for the transmission of the vibrations from the skin of the vessel to the consonant material. This figure illustrates a plan that may be followed in
125 general where it is desirable or necessary to place the sensitive device or tank containing the same at a more or less remote point from the water or the skin of the vessel. In such cases sound posts or other acoustic conductors of suitable material between the skin
130

and the consonant base of the sensitive device or its inclosing tank will secure the desired results.

In Fig. 5 is illustrated the application of
5 consonant material to the propagation or transmission of submarine signals. In this case K represents a tank in the peak of the vessel filled or partially filled with water and formed in part by the side of the vessel.
10 Within this tank is a mass of consonant material L, supported by a rod or bar M of magnetic material. Surrounding this bar is a coil N, through which is passed a direct current imparting a constant magnetization to the bar. In addition to this coil is a coil O,
15 through which an alternating current is passed at the desired intervals for the purpose of settling the bar into molecular vibration.

20 When it is desired to transmit signals, the alternating current circuit of coil O is made and broken to produce any prearranged code. The vibrations thus imparted to the bar and intensified by the mass of consonant material are transmitted through the ship's sides
25 and the water to great distances. This figure serves merely as an illustration of the principle of the application of consonant material to the transmission of signals as the specific means for accomplishing this may be
30 very widely varied.

In the practical use of this invention I have found that California white pine, or, in general, wood similar to white pine and free
35 from resinous substances is the best consonant material for the purpose; when the surface of such woods is exposed to the water, it may be coated with shellac or similar material to prevent or reduce the absorption of
40 water.

In all of the applications of my invention, above described, and in any others carried out with due regard to the principle hereinbefore illustrated, the consonant material
45 acts as a powerful reinforcer of the sound vibrations which may be imparted to it from the water, or imparted by it to the latter. Its molecular action in the latter case is clearly distinguishable from the molar or
50 segmental action upon which bells, whistles or ordinary sound producing devices depend, and very greatly improved results are secured by its use both in transmitting and receiving sounds.

55 In the present application, in order to conform to the requirements of the Patent Office rules I claim broadly the application of consonant material as a reinforcer of sounds transmitted or received in the art of submarine signaling when such material is interposed in the manner described, between the water and source or receiver of sound vibrations. I also claim specifically the applica-
60 sound vibrations under the conditions speci-

fied, and its use in connection with a sound receiver. In another application I have made specific claims to the use of consonant material in connection with a sound producer.

What I claim herein is:

1. The improvement in the art of submarine signaling, consisting in the combination with a source or receiver of sound vibrations, of a body of consonant material directly associated in acoustic relation therewith, and interposed between the same and the water, and adapted to intensify the vibrations by which it is excited, as set forth.

2. The combination of a receiving device sensitive to sound vibrations transmitted through the water, of a sound intensifier consisting of a body of consonant material directly associated in acoustic relation therewith, and interposed between said receiver and the water so as to be excited to consonance by sound vibrations in the water, and impart the amplified vibrations to the sensitive device, as set forth.

3. The means for receiving sound vibrations transmitted through water, comprising in combination a body of consonant material attached to the side of a vessel so as to be excited to consonance by sound vibrations received through the same from the water, and a sensitive receiving device directly associated in acoustic relation therewith, and acted upon by the consonance of the said body, as set forth.

4. The means for receiving sound vibrations transmitted through water, comprising in combination a tank secured to the side of a vessel, a receiving device sensitive to sound vibrations, and a body of consonant material directly associated in acoustic relation therewith, and adapted to be excited to consonance by sound vibrations received from the water through the wall of the vessel, and to impart the same to the sensitive device within the tank, as set forth.

5. The means for receiving sound vibrations transmitted through water, comprising in combination a body of consonant material attached or secured to the side of the vessel, a tank or receptacle secured to such body and formed in part thereby and a sensitive receiving device immersed in said tank, as set forth.

6. The means for receiving sound vibrations transmitted through water comprising, in combination, a vessel, a receiving device sensitive to sound vibrations, a body of consonant material supporting the same and acoustic conductors between the side of the vessel and the consonant material, and constituting paths for the transmission of vibrations from the water to the receiving device, as set forth.

7. The means for receiving sound vibrations transmitted through water, comprising,

in combination, a vessel, a tank formed in part by a body of consonant material, a receiving device sensitive to sound vibrations within said tank and acoustic conductors
5 between the submerged skin of the vessel and the said body of consonant material, and constituting paths for the transmission of vibrations from the water to the receiving device, as set forth.

LUCIEN I. BLAKE.

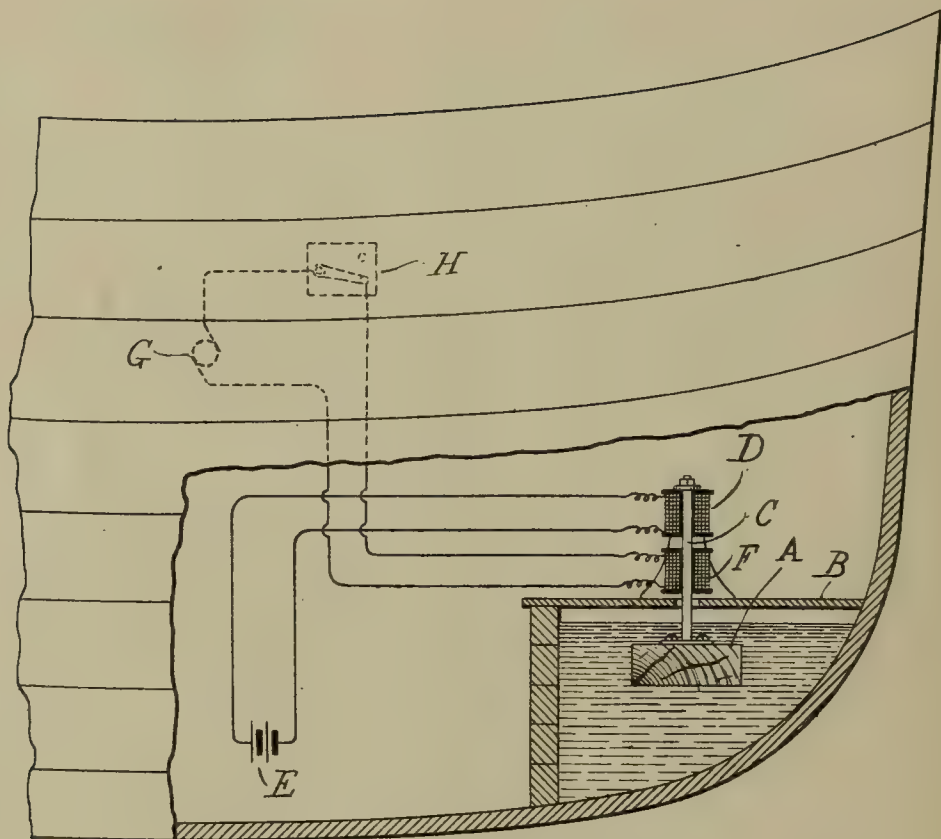
Witnesses:

J. CONVERSE GRAY,
G. I. BENTLEY.

No. 852,649.

PATENTED MAY 7, 1907.

L. I. BLAKE.
TRANSMITTER FOR SYSTEMS OF SUBMARINE SIGNALING.
APPLICATION FILED JAN. 29, 1907.



Witnesses:
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S. Dunham.

Lucien L. Blake
Inventor
By *his Attorneys*
Metz, Page & Cooper

UNITED STATES PATENT OFFICE.

LUCIEN I. BLAKE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

TRANSMITTER FOR SYSTEMS OF SUBMARINE SIGNALING.

No. 852,649.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed January 29, 1907. Serial No. 354,625.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Transmitters for Systems of Submarine Signaling, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In an application filed by me on January 5, 1907, Serial No. 350,983, I have described and claimed an invention based upon the use of consonant material as an intensifier of sound vibrations transmitted or received through water in the art of submarine signaling. My present application is that referred to therein as being specifically directed to the use of consonant material in connection with a sound producer, and in explanation of the nature and principle of the invention which forms the subject of this case, I may make the following statement: Certain substances, chiefly of a fibrous nature such as woods, possess the property of consonance. Sonorous vibrations imparted to any limited portion of these substances cause their whole mass to be excited into molecular vibrations of similar pitch. The consonant material becomes thus a secondary source of sound. It has no natural pitch of its own, as does a resonant cavity, as it is excited by a primary source of any pitch or quality, and its consonance does not depend upon its shape or size, but upon the physical properties of the material of which it is composed. Consonant materials are characterized by a cellular or fibrous structure and high molecular elasticity. Steel and glass, for example, though highly elastic, are granular or crystalline, not cellular in molecular structure, and are not appreciably consonant. White pine wood, on the other hand, is highly consonant. Resonance, as distinguished from consonance, depends upon the shape and size of cavities, and upon the "free" vibrations of the medium within the cavities, and not upon the composition of the material which bounds them. It is important to bear this distinction clearly in mind in order to arrive at a full understanding of my present invention.

My invention is based upon the application and use in a novel manner of consonant ma-

terial as a sound intensifier in submarine signaling. I have discovered that consonant material, because its action is essentially molecular, is eminently fitted to receive sound from, and to deliver it into, water, in which medium the vibrations most useful for signaling by sound are essentially molecular, and that for either purpose it acts as a powerful reinforcer of sound.

In carrying out this invention, which, as above stated, is limited to the use of consonant material for intensifying sounds delivered into or transmitted through water, I interpose between the water and the source of sound, a body of consonant material. This, evidently, may be accomplished in a great many ways, but I have secured the best results by the use of devices of substantially the following description. A mass of consonant material is immersed in the water at any given station, whether on shore or in the vicinity of a vessel,—in which latter case it may be immersed in the peak or other tank within the vessel, the walls of which tank are composed in part of the sides of the vessel itself. In either case, the body of consonant material is excited to powerful consonance by any suitable primary sound producer, such as the stem of a power operated reed or rod longitudinally excited by an electric current. In this case the consonant substance becomes a secondary source of molecular vibrations which are delivered into the water.

In the drawing hereto annexed I have illustrated in detail a transmitter embodying my invention.

The figure represents a portion of the bow of a vessel partly in section, with the transmitter immersed in a tank therein, and the necessary electric circuits in diagram.

A is a block or mass of consonant material immersed in the body of water through which sound signals are to be transmitted. As shown, the block A is immersed in the water with which a tank B in the peak of the vessel is more or less filled, but, as is now well known, when such a tank is formed in part by the walls of the vessel, the sound is conveyed as readily as though the sound producer were in the water outside of the vessel.

The block A is supported in the tank B by means of a rod or bar C of magnetic material. Surrounding this bar is a coil D through

which is passed a direct current from any suitable source, as from a battery E, and imparting a constant magnetization to the bar. In addition to this coil is a coil F, included in the circuit of any suitable generator of alternating currents G, and including a circuit controller H located at some convenient point on the vessel. By means of such controller the alternating current is passed through coil F at the desired intervals for the purpose of setting the bar C into molecular vibration.

When it is desired to transmit signals, the controller is operated to make and break the alternating current circuit according to any prearranged code. The vibrations thus imparted to the bar and intensified by the mass of consonant material A, are transmitted through the ship's sides and the water to great distances. Any suitable sound receiver sensitive to molecular vibrations may be employed in the usual way to render such signals audible.

It is obvious that the principle of this invention may be carried out in many ways, and the above is intended as a typical example of any suitable form of vibrator for exciting the block A to consonance, although it represents the best way which is now known to me for accomplishing this result.

In the practical use of this invention I have found that California white pine, or, in general, wood similar to white pine and free from resinous substances is the best consonant material for the purpose. When the surface of such wood is exposed to the water, it may be coated with shellac or similar material to prevent or reduce the absorption of water.

In all of the applications of my invention when carried out with due regard to the principle hereinbefore illustrated, the consonant material acts as a powerful reinforcer of the sound vibrations which may be imparted to it and by it to the water. Its molecular action in such case is clearly distinguishable from the molar or segmental action upon which bells, whistles or ordinary sound producing devices depend, and very greatly improved results are secured by its use.

What I claim as my invention is:—

1. In submarine signaling by sound, the means herein described for producing and transmitting signals, comprising in combination a source of sound vibrations and a body of consonant material interposed between the same and the water and adapted to be excited to consonance by the vibrations of said source, as set forth.

2. The means for transmitting sound vibrations through water comprising, in combination, a body of consonant material immersed in the water and a vibrator controllable at will for exciting the said body to consonance, as set forth.

3. The means for transmitting sound vibrations through water, comprising, in combination, an electro-magnetic vibrator, a controlling circuit for the same, and a body of consonant material immersed in the water and adapted to be excited to consonance by the action of said vibrator, as set forth.

4. A transmitter for submarine signaling by sound, comprising, in combination, a body of consonant material, a bar of magnetic material connected therewith, and an energizing circuit adapted to set up vibrations in said bar, as set forth.

5. A transmitter for submarine signaling by sound, comprising, in combination, a body of consonant material, a bar of magnetic material connected therewith, energizing coils surrounding said bar, a source of direct current including in its circuit one of said coils, and a controllable source of alternating current including in its circuit the other of said coils, as set forth.

6. The means for transmitting sound vibrations through water, comprising, in combination, a vessel, a tank formed in part by the side of the vessel, a body of consonant material immersed in water in said tank and a vibrator adapted to excite said body to consonance, as set forth.

LUCIEN I. BLAKE.

Witnesses:

MACALLASTER MOORE,
J. CONVERSE GRAY.

No. 852,725.

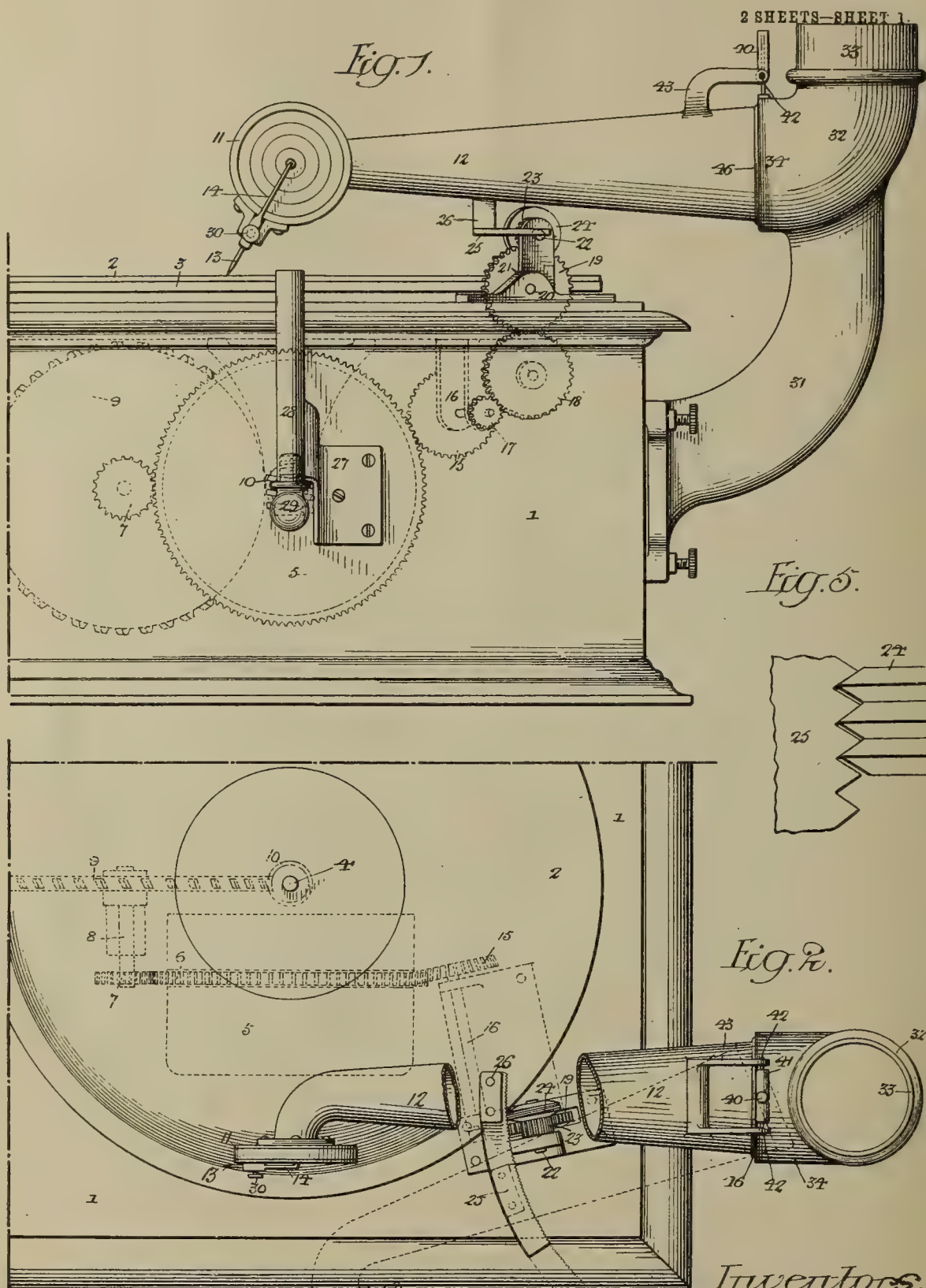
PATENTED MAY 7, 1907.

T. KRAEMER & H. SHEBLE.

TALKING MACHINE.

APPLICATION FILED DEC. 19, 1905.

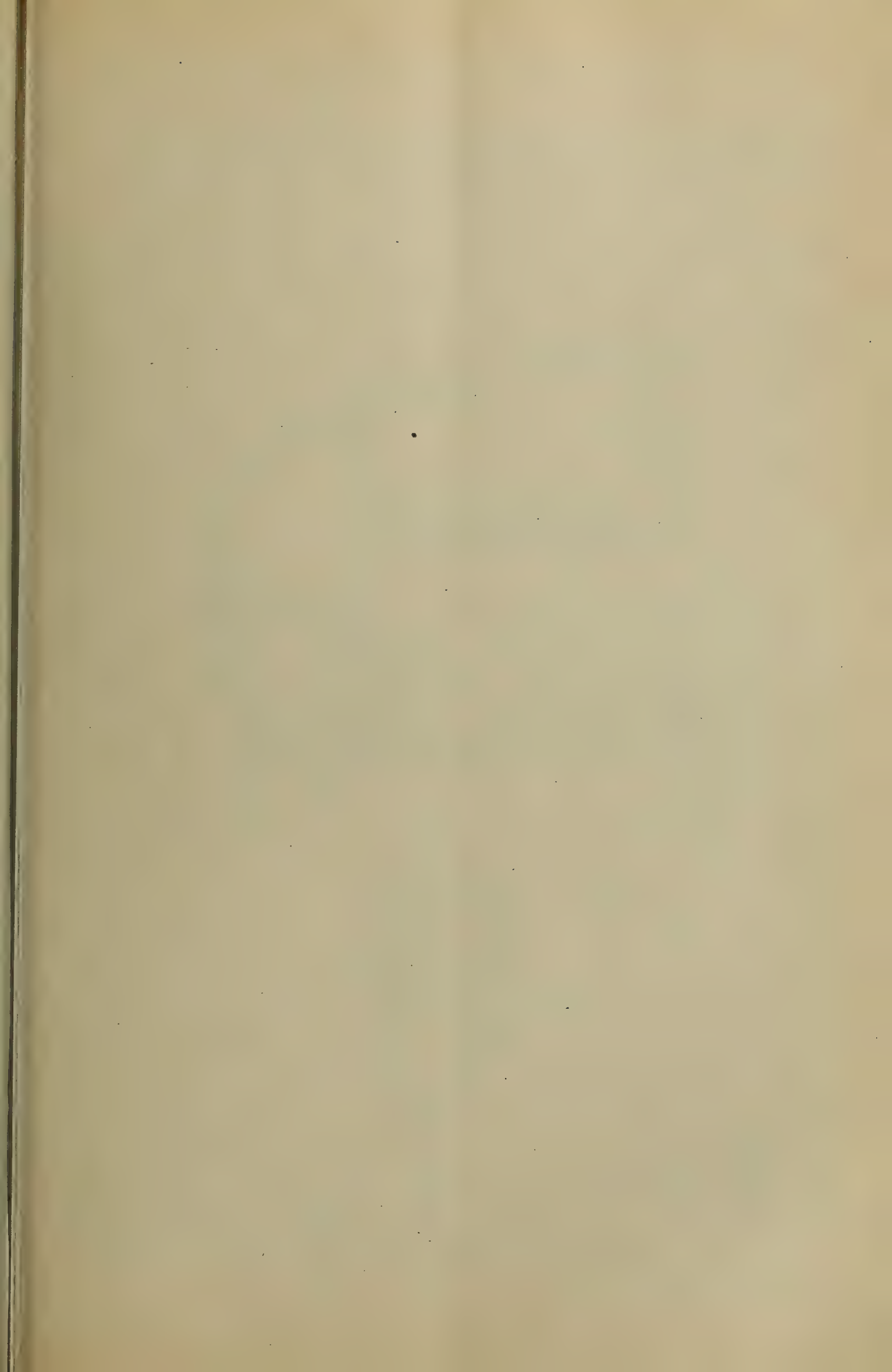
2 SHEETS—SHEET 1.



Witnesses:
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Wills A. Burrows

Inventors,
Thomas Kraemer.
Horace, Sheble.

by their Attorneys.
Hosack & Hosack



No. 852,725.

PATENTED MAY 7, 1907.

T. KRAEMER & H. SHEBLE.

TALKING MACHINE.

APPLICATION FILED DEC. 19, 1905.

2 SHEETS—SHEET 2.

Fig. 3.

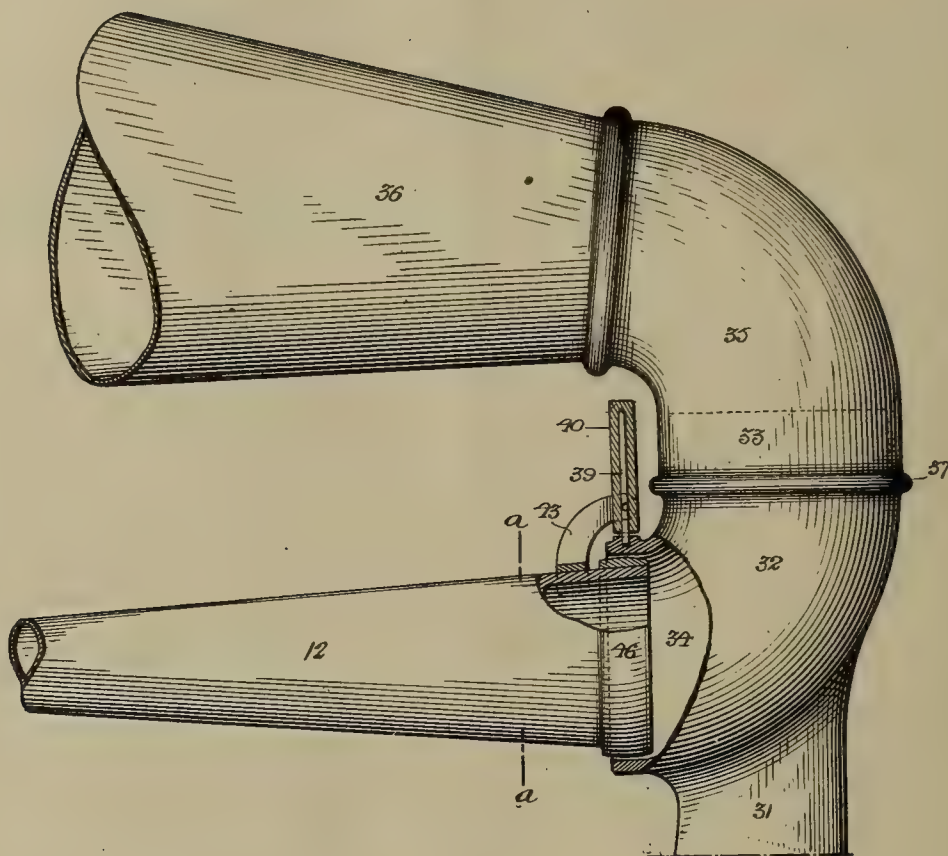
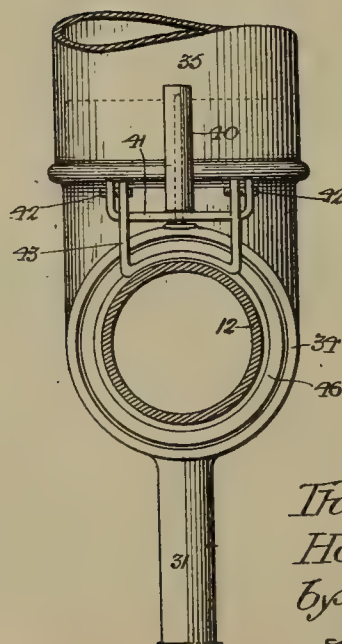


Fig. 4.



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by their Attorneys:
Hosmer & Howes

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER AND HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO HAWTHORNE AND SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 852,725.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed December 19, 1905. Serial No. 292,429.

To all whom it may concern:

Be it known that we, THOMAS KRAEMER and HORACE SHEBLE, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Talking-Machines, of which the following is a specification.

The object of our invention is to provide simple and effective means for so mounting and controlling the hollow arm carrying the sound-box of a disk-record talking machine, that said arm can be swung in any desired direction without restraint because of pressure exerted upon a pivotal portion of the arm by the amplifying horn used in connection with the machine, and can be caused to follow the spiral groove of the record without wear upon the walls of said groove.

In the accompanying drawing Figure 1 is a side elevation of sufficient of the motor box of a disk-record talking machine and of the sound-box-carrying arm and mounting therefor to illustrate our present invention; Fig. 2 is a plan view of the same with part of the sound-box-carrying arm broken away, parts of some of the convolutions of the spiral groove of the record being also shown; Fig. 3 is a view, partly in elevation and partly in vertical section, of the mounting for the sound-box-carrying arm, this view showing also part of the amplifying horn and its mounting; Fig. 4 is a transverse section on the line *a-a*, Fig. 3, and Fig. 5 is an enlarged view of part of the device.

1 represents part of the motor-containing box of that type of talking machine in which the record is formed upon a flat disk 2, the latter being mounted upon a rotating table 3, having a central spindle 4, and rotative movement being imparted to said spindle from the spring structure 5 by means of a spur wheel 6, a spur pinion 7, a counter shaft 8, and spiral toothed gears 9 and 10. In machines of this type the sound box 11 is carried by a hollow arm 12, and the latter is usually mounted so as to swing about a vertical axis, whereby, when the stylus 13, which is carried by the stylus lever 14 of the sound-box, has been caused to engage with the spiral groove of the record 2, it will follow said groove as the record is rotated, the hollow arm 12 swinging about its axis so as to permit such movement of the stylus, which, of course, is

independent of its rapid vibration due to the wavelike configuration of the groove, these rapid vibrations being transmitted through the medium of the stylus lever to the diaphragm of the sound-box, so as to reproduce the sounds represented by said wavelike configuration of the groove.

In carrying out our invention, we impart swinging movement to the arm 12 by means independent of the record, this movement being so timed in respect to the speed of rotation of the record that the stylus 13 will follow the spiral groove without such pressure upon either wall of the same as to have any material wearing effect thereon, hence the integrity of the record will be preserved indefinitely. This independent movement of the swinging arm 12 is effected in the following manner: Meshing with the same spur wheel 6 of the spring structure which drives the spindle 4 of the record-carrying table 3, is a spur pinion 15, mounted upon a shaft 16, the latter being mounted in suitable bearings within the motor box 1, or upon the under side of the lid of the same, and having another spur pinion 17 which meshes with a spur gear 18 inside the box, said spur gear 18 being in mesh with another spur gear 19 which projects through the lid of the box and is mounted upon a short shaft or spindle 20 carried by a bearing 21 on the lid of the box, said bearing also carrying another short shaft or spindle 22, which is secured to, or forms part of, a worm 24, as shown in Fig. 2. The spur pinion 23 meshes with the spur wheel 19 and the worm 24 is in mesh with the teeth of a segment 25 which is carried by, or forms part of, a post 26, depending from the under side of the hollow arm 12, as shown in Fig. 1, the teeth of the segment 25 and worm 24 being of a pitch corresponding with the pitch of the spiral groove of the record, whereby the stylus 13 will always be maintained in said groove. Some play is permitted between the threads of the worm 24 and the teeth of the segment 25, however, as shown in Fig. 5, so that the stylus 13 can accommodate itself to any slight departure from a true spiral course presented by the groove of the record.

At one side of the motor box 1 is a bracket 27 carrying a stud 28 which has, at the bottom, a screw-plug 29, the upper end of this tubular stud 28 serving as a support for the

stylus lever when the sound-box-carrying arm is thrown to one side, as shown by dotted lines in Fig. 2. When the stylus lever is thus supported, the stylus 13 can be dropped from the same into the tubular stud 28 by slackening the confining screw 30, whereby said stylus is normally secured to the stylus lever, the discarded stylus then dropping into the tubular stud 28, and when a sufficient number of them have accumulated therein, they can be discharged therefrom by removing the plug 29 at the bottom of the same.

In order to mount the sound-box-carrying arm 12 so that it can swing freely to and fro and can be lifted in order to free the stylus from engagement with the record and permit of the application of a fresh stylus to the stylus lever, we mount said arm 12 in the following manner. A bracket 31 secured to the side or end of the motor box 1 is provided at its upper end with a tubular elbow 32 having a vertical termination or mouth 33 and a horizontal, or substantially horizontal, termination or mouth 34. To the termination 33 is pivoted another elbow 35 which carries the amplifying horn 36 of the machine, and is supported vertically by a rib or flange 37 on the vertical member of the elbow 32, whereby said horn is free to turn about a vertical axis. Secured to, and projecting upwardly from, the horizontal termination or mouth 34 of the elbow 32, is a vertical pin 39, upon which is pivotally mounted a socket 40, which is provided, at its lower end, with a laterally branching yoke 41, terminating in pintles 42, and to these pintles are hung the upwardly and rearwardly curved arms of a yoke 43 secured to the top of the hollow arm 12. The open end of the hollow arm 12 projects into the horizontal termination or mouth 34 of the elbow 32, and this projecting portion is provided with an external ring or collar 46, whose external configuration constitutes a segment of a sphere, and, as the vertical pin 39 forms what is practically a continuation of a vertical diametrical line drawn through the mouth 34 of the elbow 32, a certain amount of lateral swing of the hollow arm 12 is permitted without withdrawing its end from engagement with the said mouth.

When a more extended lateral swing is desired, the free end of the arm is lifted so that the arm will swing upon its pivots 42, and, as the latter are in a plane above the mouth 34, the open end of the arm can be fully withdrawn from said mouth, whereupon the arm can be swung laterally in either direction to any desired extent, the amount of lift thus provided also insuring free access to the stylus lever of the sound box, and thus permitting ready removal of an old or worn stylus, and the ready application of a new and unworn one.

We claim:

1. The combination of the rotating record holder of a disk-record talking machine, a sound-box having a record-engaging stylus, a swinging sound-box-carrying arm and a device for moving the latter having, as elements, a toothed segment and a worm loosely engaging the same, so that the stylus can accommodate itself to any slight departure from a true spiral course presented by the groove of the record.

2. The combination of the rotating record holder of a disk-record talking machine, a sound-box having a record-engaging stylus, a swinging sound-box-carrying arm, and a support for said arm when the stylus is free from engagement with the record, said support consisting of a tubular stud mounted upon the motor box of the machine.

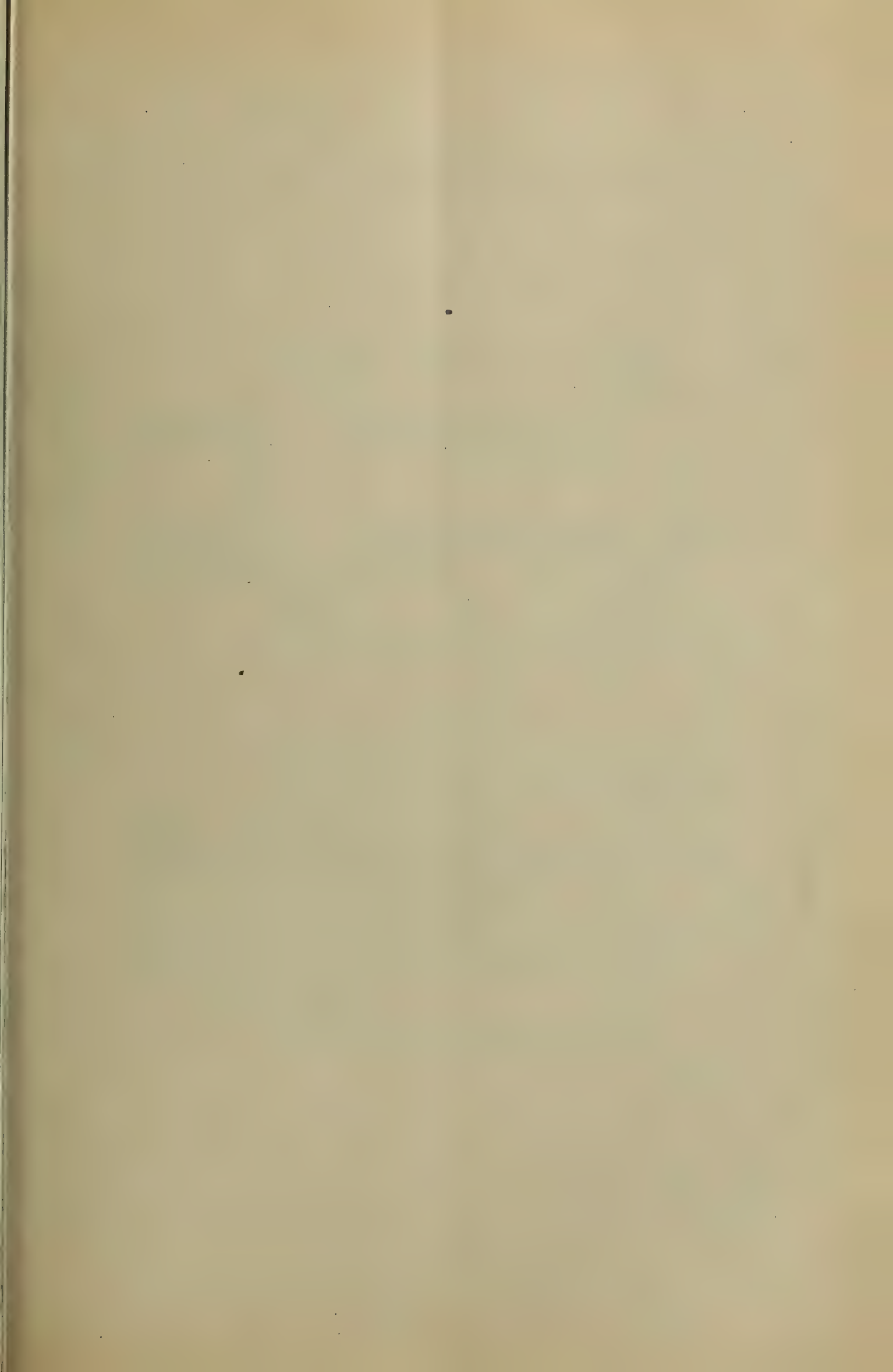
3. The combination of the rotating record holder of a disk-record talking machine, a sound-box having a record-engaging stylus, a sound-box-carrying arm, a support therefor having a projecting vertical pin, a socket pivotally mounted upon said pin and carrying a yoke, and a second yoke carried by the arm and pivotally mounted upon the yoke of the socket.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses.

THOMAS KRAEMER.
HORACE SHEBLE.

Witnesses:

KATE A. BEADLE,
JOS. H. KLEIN.



L. I. BLAKE.
RECEIVER FOR SYSTEMS OF SUBMARINE SIGNALING.

APPLICATION FILED JAN. 29, 1907.

2 SHEETS—SHEET 1.

Fig. 1

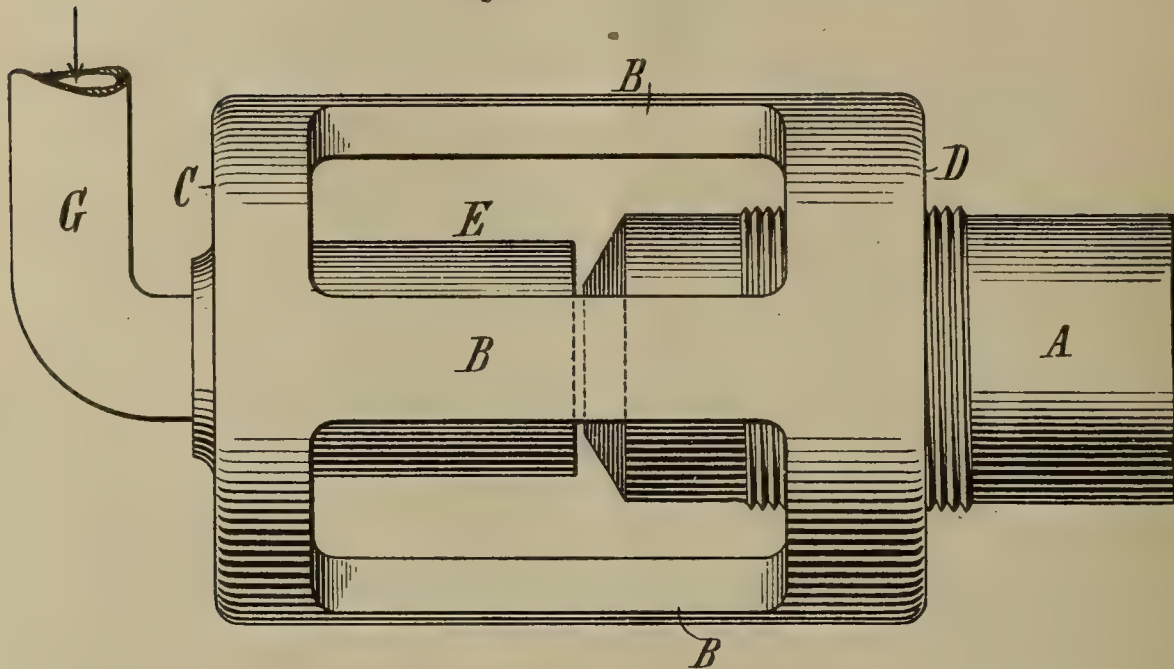
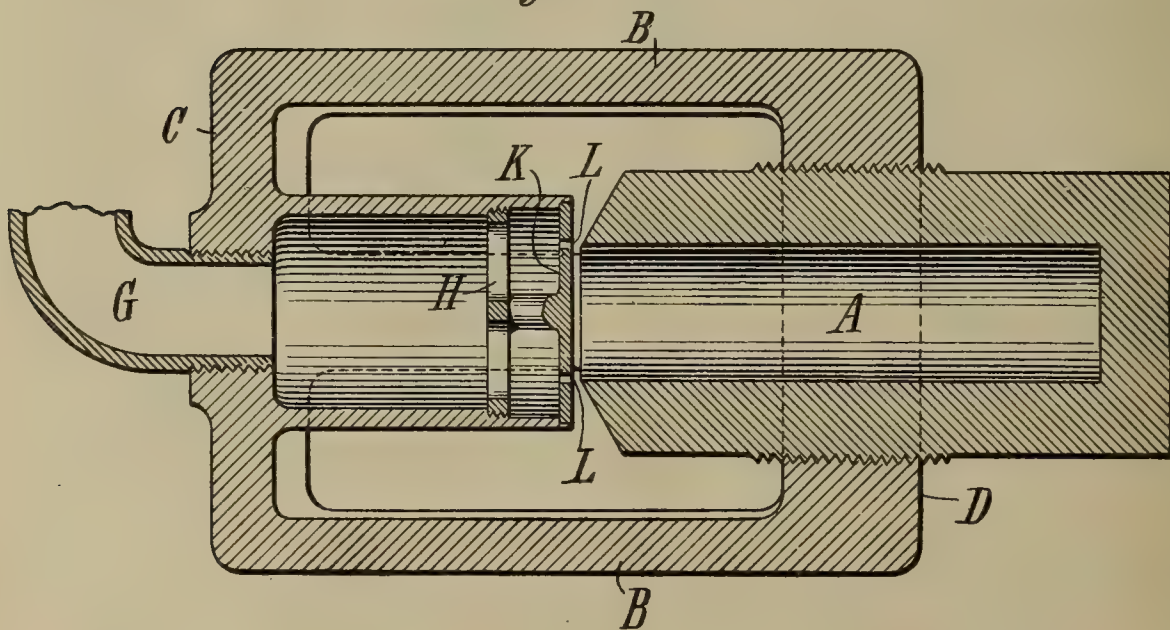


Fig. 2

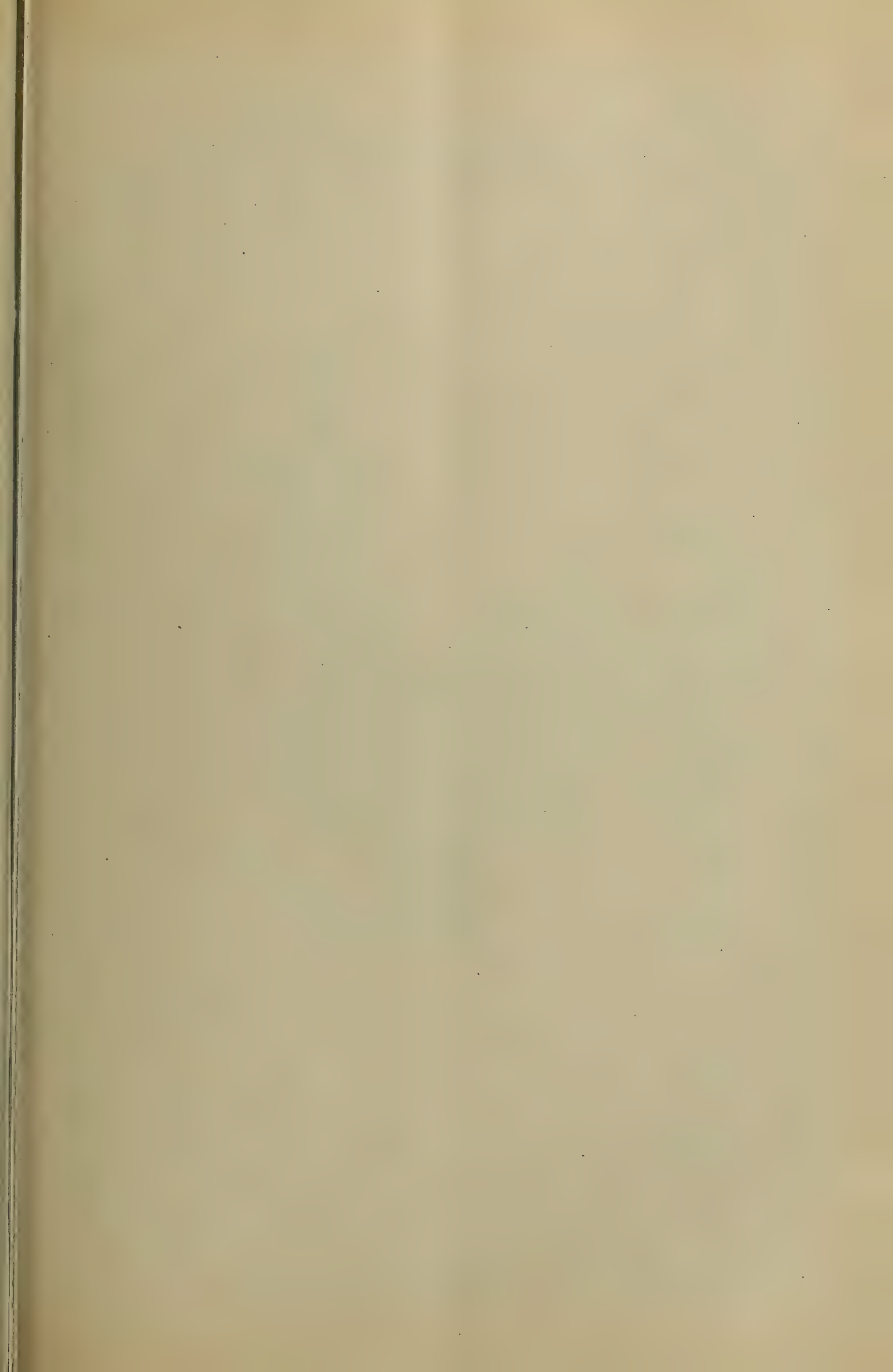


Lucien I. Blake

Inventor

Witnesses:
Raphael Ketter
S. S. Dunham

By his Attorneys
Kerr, Page & Cooper



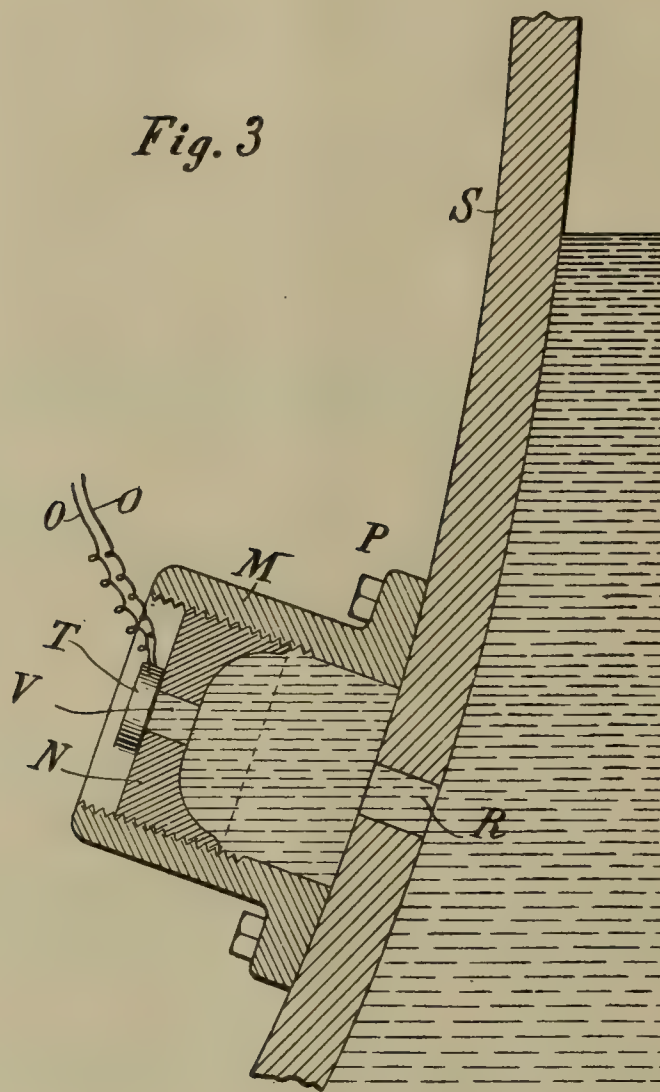
No. 852,760.

PATENTED MAY 7, 1907.

L. I. BLAKE.
RECEIVER FOR SYSTEMS OF SUBMARINE SIGNALING.

APPLICATION FILED JAN. 29, 1907.

2 SHEETS—SHEET 2.



Witnesses:
Raphael Letter
S. S. Dunham

Lucien L. Blake,
Inventor

By his Attorneys
Kerr, Page & Cooper

UNITED STATES PATENT OFFICE.

LUCIEN I. BLAKE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

RECEIVER FOR SYSTEMS OF SUBMARINE SIGNALING.

No. 852,760.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed January 29, 1907. Serial No. 354,626.

To all whom it may concern:

Be it known that I, LUCIEN I. BLAKE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Receivers for Systems of Submarine Signaling, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

As an understanding of the nature of the invention upon which my present application is based, involves a knowledge of the phenomenon of resonance, the following statement of well recognized principles is apposite.

The fundamental principle of acoustic resonance is reflection. In any portion of a gaseous medium which is isolated,—by which term as used herein is meant wholly or partially confined by boundary walls of any suitable material differing in its physical properties from the inclosed medium,—a reflection occurs at the surfaces of the boundary walls, of any acoustic disturbance present in that medium. This reflected disturbance will travel back and forth between the walls or boundaries to produce a tone of definite pitch, dependent upon the volume and shape of the medium inclosed. The chamber or cavity formed by the boundary walls is called a resonance cavity. The method of exciting a given medium to resonance is immaterial. It may be effected by sound vibrations brought into it from an outside and remote source, or by vibrations originating within the cavity itself.

It is not necessary in any of the applications of the principle hereinafter described, or in general, that the cavity be entirely surrounded by reflecting walls, for an opening may be left in the latter through or at which vibrations may be imparted to the medium within the cavity, and another through which the regular periodic vibrations of the medium affected may be communicated to any other medium without the boundaries of the cavity. The function of the resonance cavity thus becomes a reinforcer of sound, whether received or produced.

In all aerial sound producers resonance chambers are the essential elements for giving

intensity of sound. Their action is exemplified in the case of organ pipes and whistles. In these the column of air inclosed within the walls of the resonance chamber is set into regular periodic or harmonic vibration at the embouchure by either the so-called flute mouth-piece or a reed. When the length of the air column is great in comparison with its other dimensions, as in the case of a pipe, the pitch is controlled by the period of travel of the disturbance from end to end of the pipe, and this is called the free period of the pipe. In the flute mouth-piece form a thin jet of air or steam impinges upon the sharp edge of an opening into the chamber and the rhythmic effect of friction produces a vibrating reed of air or steam which is continually controlled in its rate of vibration by the regular periodic vibrations of the column of air in the pipe.

In the case of the reed mouth-piece the reed is set in vibration by the air or steam impinging upon its unconfined edge, and the air or steam column sustains and reinforces these vibrations, controlling their rate and consequently the pitch of the tone if the reed be not too stiff. In either case the free vibration of the column within the pipe or chamber is the essential source of sound.

In connection with the consideration of the action or effect of these resonance cavities, it is important to bear in mind the distinction between the free vibration of the inclosed medium and the forced vibrations which occur in consonant materials excited by any source of sound. In the phenomenon of resonance, one definite pitch is conspicuous or natural for each given set of conditions, while in the case of consonance, sounds of any pitch are reinforced. In the former the size and shape of the mass of confined medium control in determining the pitch, the character of the containing walls, within certain limits hereinafter more fully explained, being immaterial provided they are capable of reflecting the disturbances; while in the latter, the physical character of the consonant body is the controlling consideration, size and shape being immaterial.

I have discovered and practically demonstrated that under proper conditions a liquid medium may be readily brought into sonorous

ous resonance with a tone of given pitch, and that an isolated portion of liquid medium possesses, according to its dimensions, a certain musical pitch of its own. If, under
 5 such conditions, harmonic vibrations be set up within a body of liquid the latter may be caused to strongly reinforce these vibrations and consequently intensify the sound produced by them. Such a liquid mass will also
 10 reinforce sounds delivered into it from a distance, whereby weak tones will be rendered more audible, so that it may, therefore, be utilized, like an aerial resonator, both for the production and reception of sounds. Avail-
 15 ing myself of this discovery, I have employed liquid resonators in systems of submarine signaling with results of a highly useful and novel character.

The desirability of securing the advantages of resonance for intensifying sound, either produced for transmission or received from a distant source, in the art of submarine signaling, has been recognized by those skilled in the art. As an abstract proposition it is, in fact, self suggestive from analogous results in the application of the same broad principle in the case of wind instruments, whistles, and in general those devices in which a sound of given pitch is reinforced by a resonating body of air or gas.
 30 No useful or practical application of the principle to submarine signaling, however, has ever been made, so far as I am aware, and for the reason, which my discovery has now rendered apparent, that conditions essential to the attainment of the resonance of isolated bodies of liquid, have not been recognized or secured in any apparatus that has been designed or proposed for use either as
 40 producers or receivers of sound under water.

In all wind instruments and other devices in which the resonance of a confined or isolated body of air is utilized, the resonating medium is of such a highly compressible nature in comparison with the materials ordinarily constituting its boundaries, that the latter may be of almost any rigid material, such as wood, paper or very thin metal. If, however, the medium which it is desired to
 45 set into resonance be a liquid, which is practically incompressible as compared with any gas, the rhythmic changes of pressure within it which correspond to sound, exert exceedingly powerful total pressures over the
 55 boundary walls of the chamber or cavity containing the liquid, according to the laws of hydrostatics. Such pressures, as is well known, may bend and even burst walls of ordinary strength. Therefore, if liquid resonators be constructed without due regard to the effect upon the retaining walls of these variations of hydrostatic pressure, they present conditions which actually remove the elements upon which reflection depends, but
 65 the effect of which is negligible when the

medium is an easily compressible gas, such as air. It is for this reason that a water column in an ordinary organ pipe does not produce resonance. This may be conclusively demonstrated by the following experiments: 70
 If a pipe 4 inches in cross sectional area and several feet long be made of hard metal, say $\frac{1}{8}$ of an inch thick, which would produce very much greater rigidity than would be required in any ordinary tone-producing 75 instrument, and provided with an embouchure similar to that of an organ pipe, it may, if submerged in water, be operated to produce a tone by a jet of water in the same manner as an organ pipe is operated by air. 80
 It will be found, however, that the tone produced has a pitch wholly independent of the length of the pipe, thus showing that the water column is not set in resonance. The reason for this, as I have found, is that the 85 rigidity of the walls is not sufficient to withstand the variations in hydrostatic pressure and thereby reflect the regular periodic or harmonic vibrations imparted to the mass of liquid within the pipe. If the walls of the 90 pipe yield, then any change in the pressure originating at the embouchure of the inclosed liquid will be instantly relieved at that point, and therefore no change in pressure will be propagated through the pipe to undergo reflection, and thereby to produce resonance. In short, the liquid column remains quiescent at its normal pressure, and takes no part whatever in the production or reinforcement of sound. If the same pipe, 100 however, be made of very hard and tough steel, with walls even more unyielding than the practically incompressible water surrounding them, it will be found to produce, when operated by a water jet in the same 105 way, a tone of definite pitch that varies with the length of the pipe, thus proving that the liquid mass within the same is brought into resonance. To convey an idea of what is required in securing the proper character of inclosing walls for a liquid resonator, it may be stated that air is over twenty thousand times more compressible than water; and water over sixty times more compressible than hard steel, so that to secure the requisite rigidity of the walls in the case of a liquid resonator I have found it necessary to build them up by shrinking very tough steel tubes upon one another. 115

Applying the principle of the discovery 120 that the boundary walls of the chamber or cavity for a liquid resonator must be of this special character in order to withstand the variations of hydrostatic pressure, and thereby produce the reflection characteristic of resonance, I have produced apparatus for use in systems of submarine signaling capable of intensifying sounds, both sent and received, and which possess all the advantages in submarine work which distinguish similar 130

devices for aerial sound-producing and signaling purposes, and which have always been recognized and adopted as the most effective for fog signals, alarms and similar purposes.

In an application filed by me on January 8th, 1907, Serial No. 351,361, I have illustrated the application of the principle of resonance to both sound producers and sound receivers for submarine systems, but have confined the more specific claims to the former and to features of novelty that are common to both forms of instrument. In the present application the claims are directed to those features of novelty which more particularly distinguish the application of the principle to sound receivers. I have, however, as a more convenient illustration of the principle, shown in the accompanying drawings, the sound producer of the application referred to.

Referring now to the accompanying drawings, Figure 1 is a view in elevation of the sound producer, showing the means for operating the same. Fig. 2 is a longitudinal cross-section of the operative parts of the same. Fig. 3 is a sectional view of the sound receiver in which the invention upon which my present application is based, is embodied.

Referring to Figs. 1 and 2, A is a cylinder of steel. It is shown as closed at one end and with the other open end beveled on an angle of about 60 degrees to sharp edges. It is not necessary that the cylinder be closed, but, as will be understood, to secure the same free period of vibration of a column of liquid within it, an open cylinder must be of double the length. In practice I have found that for good results a cylinder designed for a given pitch and having a bore of 3 inches in diameter and 11 inches long should have walls $1\frac{1}{2}$ inches in thickness of very hard tough steel built up by shrinking several tubes, one over the other. B, B, are side bars connecting the heads C, D, of a rigid frame. In the head C is secured, or integral with it is cast, a chamber E, provided with an inlet, through which water is introduced by a pipe G from any suitable source capable of delivering it at a high pressure. Within the chamber E is a spider H carrying a plate K of slightly smaller diameter than an opening in the end of the chamber, and which therefore leaves an annular orifice L preferably of about $\frac{3}{8}$ of an inch in width. In the head D is a circular opening with threaded walls with which corresponding threads on the exterior of the cylinder A engage. By this means the cylinder is rigidly supported with its beveled edge in proper position relative to the annular orifice L and with the capability of adjustment with respect thereto. The cylinder A is adjusted to bring its edge in close proximity to the annular orifice L, and is submerged at any desired point where the sounds or signals are to be produced. Water

under pressure, preferably from 125 to 200 pounds, is then supplied to the chamber E, and issuing therefrom in the form of an annular jet impinges upon the edges and beveled end of the cylinder A, with the result that the harmonic or regular periodic vibrations are set up in the column of water within the cylinder. These vibrations, owing to the unyielding character of the boundaries of the chamber or cavity in which the column of water is contained are reflected back and forth from the walls and the column is therefore set in sonorous resonance. Such an apparatus will produce a tone of definite pitch dependent upon the dimensions of the chamber or cavity within the cylinder A. I have found that sounds thus produced will be carried to great distances through water and may be detected and rendered audible by suitable sound receiving instruments the more readily because of their distinctive musical character. By interrupting or varying the pressure of the water supplied to the chamber E, or by deflecting the jet issuing from the orifice in said chamber, distinctive signals, according to any prearranged code, may be sent by this device.

In Fig. 3 which illustrates the device for receiving sound S represents a portion of the skin of a steel vessel, which is selected for purposes of illustration. To the inner surface of the skin is secured, as by means of bolts P passing through flanges at its end, a steel cylinder M of the same character as that described in connection with Figs. 1 and 2. The opposite or inner end of the cylinder M is closed by a head N of corresponding thickness, the edges of which are threaded to engage with threads in the inner surface of the cylinder. A small orifice V is formed in the head N and an ordinary microphonic transmitter T is secured over the same or placed at any point at which it will be operated by the resonance of the column of water contained in the cylinder M. Wires O, O, connect the microphone with an ordinary telephone receiver. A small opening R may be drilled through the ship's skin in order to permit access of the water into the cylinder M, but this is not necessary for reasons previously described, as sounds coming through the water would be transmitted through the wall of the ship to the water column in the cylinder M, even were no passage of communication present. The head N, by means of its threaded connection with the cylinder M, may be adjusted to vary the dimensions of the chamber within the cylinder, and thus control the pitch of the resonant cavity in order to tune it to any desired source of sound. In this device the column of water within the cylinder M will be set in resonant vibration by a given sound transmitted to it through the water and entering either through the ship's wall or the opening R.

The sound thus intensified operates the microphone, which produces in the telephone receiver an audible sound.

While I have described the invention by reference to a specific form of apparatus, it is evident that its construction may be greatly varied. In general, the sound receiver may be submerged at any selected station or placed in a tank attached to the walls of a vessel so that by means of the apparatus signals may be transmitted from the shore to a vessel, or conversely, or between vessels within the limits of practical transmission.

What I claim as my invention is:

1. A sound receiver for submarine signaling systems, comprising in combination a receptacle with walls capable of withstanding the variations of hydrostatic pressure accompanying regular periodic vibrations in a body of liquid contained therein, and reflecting the same to produce resonance, and a sensitive device adapted to be acted upon by such vibrations, as set forth.

2. A sound receiver for submarine signaling systems comprising in combination a receptacle secured to the side of a vessel and having walls capable of withstanding the variations of hydrostatic pressure accompanying regular periodic vibrations in a body of liquid contained therein, and a sensitive device in position to be affected by such vibrations, as set forth.

3. The combination of a liquid resonator

consisting of a receptacle with rigid walls capable of reflecting regular periodic or harmonic vibrations set up in a body of liquid contained within the same, and a microphonic sensitive device, secured over an orifice in the end of the receptacle through which the vibrations are caused to act upon the sensitive device, as set forth.

4. The combination of a liquid resonator consisting of a receptacle with rigid walls capable of reflecting regular periodic or harmonic vibrations set up in a body of liquid contained within the same, and secured over an opening in the side of a vessel, and a microphonic sensitive device secured over an orifice in the end of the receptacle through which the vibrations are caused to act upon the sensitive device, as set forth.

5. A sound receiver for submarine signaling systems, comprising in combination a hollow cylinder with walls capable of withstanding the variations in hydrostatic pressure accompanying the vibrations imparted to a body of liquid contained therein and reflecting the same to produce resonance, a head adjustable in said cylinder to vary the dimensions of the chamber within the cylinder, and a sensitive device in position to be affected by the vibrations of the body of liquid, as set forth.

LUCIEN I. BLAKE.

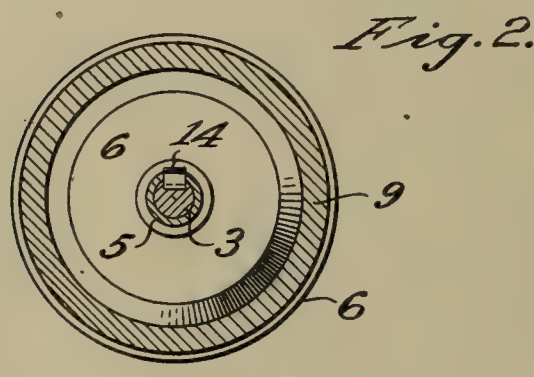
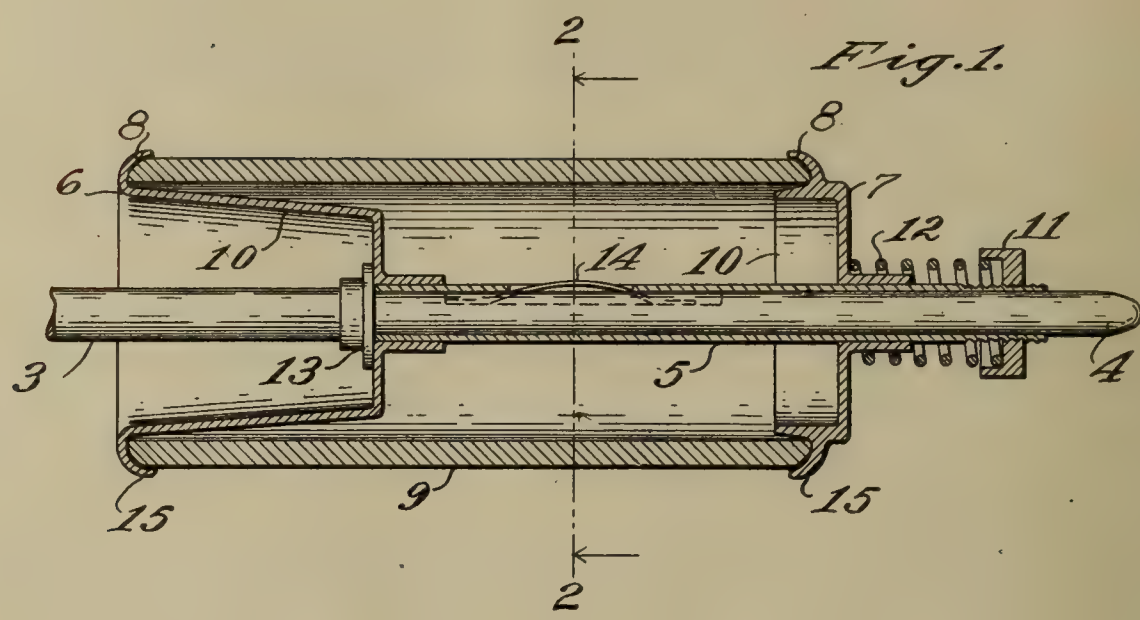
Witnesses:

MACALLASTER MOORE,
J. CONVERSE GRAY.

No. 854,002.

PATENTED MAY 21, 1907.

T. V. SKELLY.
PHONOGRAPH RECORD HOLDER.
APPLICATION FILED FEB. 11, 1907.



Witnesses:
Rudow Ammiller
L. Q. Smith

Inventor,
Thomas V. Skelly,
by Ammiller & Ammiller,
Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS V. SKELLY, OF CHICAGO, ILLINOIS.

PHONOGRAPH-RECORD HOLDER.

No. 854,002.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed February 11, 1907. Serial No. 356,787.

To all whom it may concern:

Be it known that I, THOMAS V. SKELLY, a citizen of the United States of America, and a resident of Chicago, in the county of Cook
5 and State of Illinois, have invented certain new and useful Improvements in Phonograph-Record Holders, of which the following is a specification.

The main objects of this invention are to
10 provide an improved holder for the record cylinders of phonographs and other devices for recording and reproducing vibrations; to provide a holder which will permit the record to be freely handled without touching the
15 recording surface, and which will serve as a protector for the record when it is removed from the machine; to provide a holder of this class on which a record may be permanently mounted and which may be readily
20 slipped upon the record-supporting mandrel of the machine and will then serve as a drum for supporting the record in the machine; and to provide a holder which will permit the record to freely contract or expand through
25 temperature changes without danger of breakage either when the record is on the machine or when it is removed therefrom, thus avoiding the cause of most of the breakage of phonograph records. Phonograph
30 records are usually broken through being forced too tightly upon the supporting drum, or from contraction when chilled while on the drum or from accidental blows during the handling of the records. These objects are
35 accomplished by the device shown in the accompanying drawings, in which:

Figure 1 is a longitudinal section of a phonograph record holder constructed according to this invention and showing a cylindrical
40 record in position thereon. Fig. 2 is transverse section of the same on the line 2—2 of Fig. 1.

In the construction shown in the drawings, the shaft 3 represents the mandrel of a pho-
45 nograph upon which the record cylinders are mounted. This mandrel is mounted in long bearings at the left of Fig. 1, leaving the end 4 free and unsupported. The bearing for the shaft 3 is not shown in the drawing.
50 The record-holder comprises a sleeve 5 which fits the shaft 3 and which is provided with heads 6 and 7 each having therein a conical seat 8 adapted to fit the adjacent end of a cylindrical record 9. Each head has an inner
55 conical core 10 which serves to roughly center the record, the true centering of the rec-

ord being however accomplished by the engagement of the conical ends of the record with the concave conical seats of the heads. When the record is centered, the conical
60 cores 10 are free from the inner periphery of the record so as to permit the same to freely contract without breakage. The head 6 is preferably rigidly mounted on one end of the sleeve 5 and the conical core 10 of the head
65 6 is hollow and extends a considerable distance inward of the record so as to permit the supporting bearing (not shown) to extend inward of the record and give firm support to the shaft at a point near the middle of
70 the record.

The sleeve 5 is threaded at the end opposite the head 6 and has a nut 11 mounted thereon. The head 7 is slidable longitudinally of the sleeve and is normally urged to-
75 ward the head 6 by means of a spring 12 bearing between the nut 11 and the head 7. The end 4 of the shaft 3 is preferably rounded or tapered so as to permit the holder to be easily slipped endwise upon the shaft, and
80 the shaft is provided with a shoulder 13 against which the end of the sleeve 5 bears when the sleeve is in its normal position upon the shaft. The sleeve 5 is prevented from rotating relatively of the shaft by
85 means of a spring tongue 14 which is seated in a groove in the shaft 3 and bears outward so as to engage the sleeve 5. The sleeve 5 may be provided with a seat for the spring 14 so as to avoid any possibility of relative
90 rotation of the record and supporting mandrel while in operation. The extreme outer periphery 15 of the heads 6 and 7 is preferably of greater diameter than the recording surface of the record so that the device may
95 rest upon its side on a table without injury to the record.

To place a record in the holder, the nut 11, head 7, and spring 12 are removed from the sleeve and the record is then slipped over the
100 same into engagement with the seat 8 of the head 6. The head 7 is then placed upon the sleeve in engagement with the other end of the record, and the spring and nut are replaced, the nut being screwed inward until
105 the spring 12 exerts a pressure upon the head 7. The nut and spring now serve as a handle for handling the record. By means of this handle, the record-holder may be slipped upon or removed from the shaft 3 of the ma-
110 chine. A plurality of these record-holders with their records mounted upon them in the

manner described, may be stored in a cabinet or box provided with spindles fitting the sleeve or the interior of the cone 10. The record may be stood upon end, the head 6
 5 protecting the record against damage through contact with a supporting surface or the record may be laid upon its side when the peripheries 15 will protect the recording surface from contact with the supporting surface. In commercial use, where the records
 10 upon the surface of the record cylinders are frequently shaved off, a record may be left in its holder both while in use and while being shaved, and when it has become worn out, it
 15 may be replaced by another.

Expansion of the record in a longitudinal direction is allowed through yielding of the spring 12; and expansion in a transverse direction is also permitted since the conical
 20 seats of the heads accommodate themselves to changes in diameter of the conical ends of the record cylinder through a longitudinal yielding of the spring 12. The heads protect the recording surface from contact with
 25 flat surfaces upon which the holder is laid and also protect its edges from shocks or blows.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A record-holder comprising a shaft, a
 30 pair of heads mounted thereon and adapted to engage opposite ends of a tubular record and support the same concentrically of said shaft, one of said heads being slidable on the shaft, a shoulder on said shaft adjustable longitudinally thereof, and a spring bearing between
 35 said shoulder and said slidable head and normally urging said slidable head toward the other for clamping the record between said heads.

40 2. A record-holder comprising a sleeve, a pair of heads mounted on said sleeve and each having a seat adapted to engage one end of a tubular record for supporting the record between said heads, one of said heads being
 45 slidable on the sleeve and the other being rigid thereon, and a spring normally urging said slidable head toward the other for clamping the record between said heads, said sleeve being adapted to be slipped on and off
 50 of a supporting mandrel and all being adapted to serve as a holder for handling the record when removed from such mandrel.

3. A record-holder comprising a sleeve, a pair of heads mounted on said sleeve and
 55 each having a seat adapted to engage one end of a tubular record for supporting the record between said heads, one of said heads being slidable on the sleeve and the other being rigid thereon, a spring normally urging said
 60 slidable head toward the other for clamping the record between said heads, and a nut adjustable on said sleeve for changing the tension of said spring.

4. A record-holder comprising a sleeve, a
 65 pair of heads mounted on said sleeve and

each having a seat adapted to engage one end of a tubular record for supporting the record between said heads, one of said heads being
 70 slidable on the sleeve and the other being rigid thereon, and a spring normally urging said slidable head toward the other for clamping the record between said heads, one of said
 75 heads being removable to permit the ready removal of the record, said sleeve being adapted to be slipped on and off of a supporting mandrel and all being adapted to serve as a holder for handling the record when removed from such mandrel.

5. In a device of the class described, the combination of a shaft having a free end, a
 80 sleeve mounted on said shaft and removable from said free end, means for securing said sleeve against shifting on said shaft, a head at one end of said sleeve, a removable shoulder at the other end, a second head slidably
 85 mounted on said sleeve between said shoulder and first head, and a spring bearing between said shoulder and slidable head and normally urging the same toward said first head, said heads being adapted to engage
 90 the ends of a tubular record and support the same concentrically of said shaft.

6. In a device of the class described, the combination of a rotatable shaft having a
 95 free end, a sleeve mounted on said shaft and removable from said free end, means for securing said sleeve against shifting on said shaft, a pair of heads mounted on said sleeve and movable toward each other, and a spring
 100 normally urging said heads toward each other, each of said heads having a conical seat facing the seat in the other head, and said seats being adapted to engage and center a cylindrical record mounted between
 105 said heads.

7. In a device of the class described, the combination of a shaft having a free end, a
 110 sleeve mounted on said shaft and removable from said free end, a spring tongue acting between said shaft and sleeve for securing said sleeve against shifting on said shaft, a pair of heads mounted on said sleeve and each having
 115 a seat adapted to engage one end of a tubular record for supporting the record between said heads, one of said heads being slidable on the sleeve and the other being rigid thereon, and a spring normally urging said
 120 slidable head toward the other for clamping the record between said heads.

8. In a device of the class described, the
 125 combination of a shaft having a free end, a sleeve on said shaft and removable from said free end, means acting between said shaft and sleeve and adapted to normally prevent rotation of said sleeve relatively of said shaft
 130 while permitting said sleeve to be readily withdrawn or replaced upon said shaft, a pair of heads mounted on said sleeve and each having a seat adapted to engage one end of a tubular record for supporting the rec-

ord between said heads, one of said heads being slidable on the sleeve and the other being rigid thereon, and a spring normally urging said slidable head toward the other for clamping the record between said heads.

5 9. In a device of the class described, the combination of a shaft having a free end, a sleeve fitting said shaft and adapted to be slipped upon or removed therefrom at said
10 free end, a record cylinder having conical ends, and a pair of heads mounted on said sleeve and having conical seats fitting the respective conical ends of said record cylinder, said sleeve and heads being adapted to serve
15 as a holder for protecting said record against breakage when removed from said shaft.

10 10. In a device of the class described, the combination of a shaft having a free end, a sleeve fitting said shaft and adapted to be
20 slipped upon or removed therefrom at said free end, a record cylinder having conical ends, and a pair of heads mounted on said sleeve and having therein conical seats fitting the respective conical ends of said record
25 cylinder, said sleeve and heads being adapted to serve as a holder for protecting said record against breakage when removed from said shaft, and said sleeve being extended beyond one of said heads and serving as a handle for said record.

30 11. In a device of the class described, the combination of a shaft having a free end, a sleeve fitting said shaft and adapted to be
35 slipped upon or removed therefrom at said free end, a record cylinder having convex conical ends, and a pair of heads mounted on said sleeve and having concave conical seats fitting the respective conical ends of said record cylinder, said sleeve and heads being
40 adapted to serve as a holder for protecting said record against breakage when removed from said shaft.

45 12. The combination of a tubular record cylinder of the class described, having convex conical ends, a pair of heads having concave conical seats, respectively fitting opposite ends of the cylinder, and means extending

ing through the cylinder and connecting said heads to form a holder for handling the record.

50 13. A record-holder comprising a sleeve, a pair of heads mounted on said sleeve and each having a seat adapted to engage one end of a tubular record for supporting the record between said heads, one of said heads being
55 slidable on the sleeve, and yielding means normally urging said slidable head toward the other for clamping the record between said heads, said sleeve being adapted to be slipped on and off of a supporting mandrel
60 and all being adapted to serve as a holder for handling the record when removed from such mandrel.

14. The combination of a tubular record cylinder of the class described, a pair of
65 heads respectively fitting opposite ends of the cylinder, and means extending through the cylinder, slidably connecting said heads, and having an open central part to receive a supporting mandrel, said means being adapted
70 to hold said heads into gripping engagement with their respective ends of the cylinder independently of such supporting mandrel.

15. The combination of a tubular record
75 cylinder of the class described, a pair of heads respectively fitting opposite ends of the cylinder, and means extending through the cylinder, connecting said heads, and having an open central part to receive a supporting
80 mandrel, said heads being adapted to yield longitudinally of the cylinder to compensate for expansion and contraction thereof, and said means being adapted to hold said heads into gripping engagement with their respective
85 ends of the cylinder independently of such supporting mandrel.

Signed at Chicago this 9th day of February 1907.

THOMAS V. SKELLY.

Witnesses:

L. A. SMITH,

E. A. RUMMLER.

No. 854,120.

PATENTED MAY 21, 1907.

J. S. STONE.

DEVICE FOR AMPLIFYING ELECTRICAL CURRENTS.

APPLICATION FILED MAY 23, 1906.

2 SHEETS—SHEET 1.

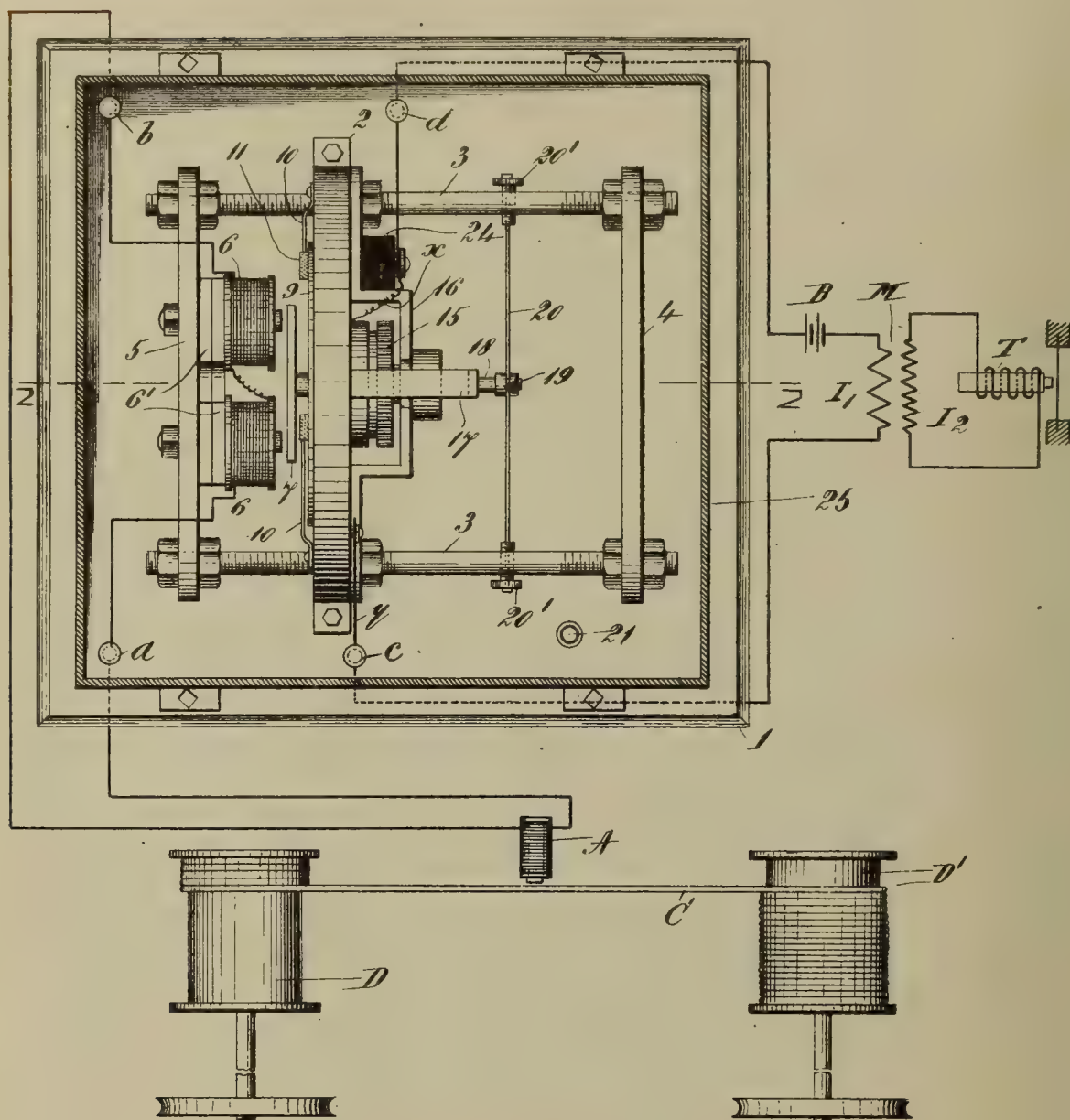
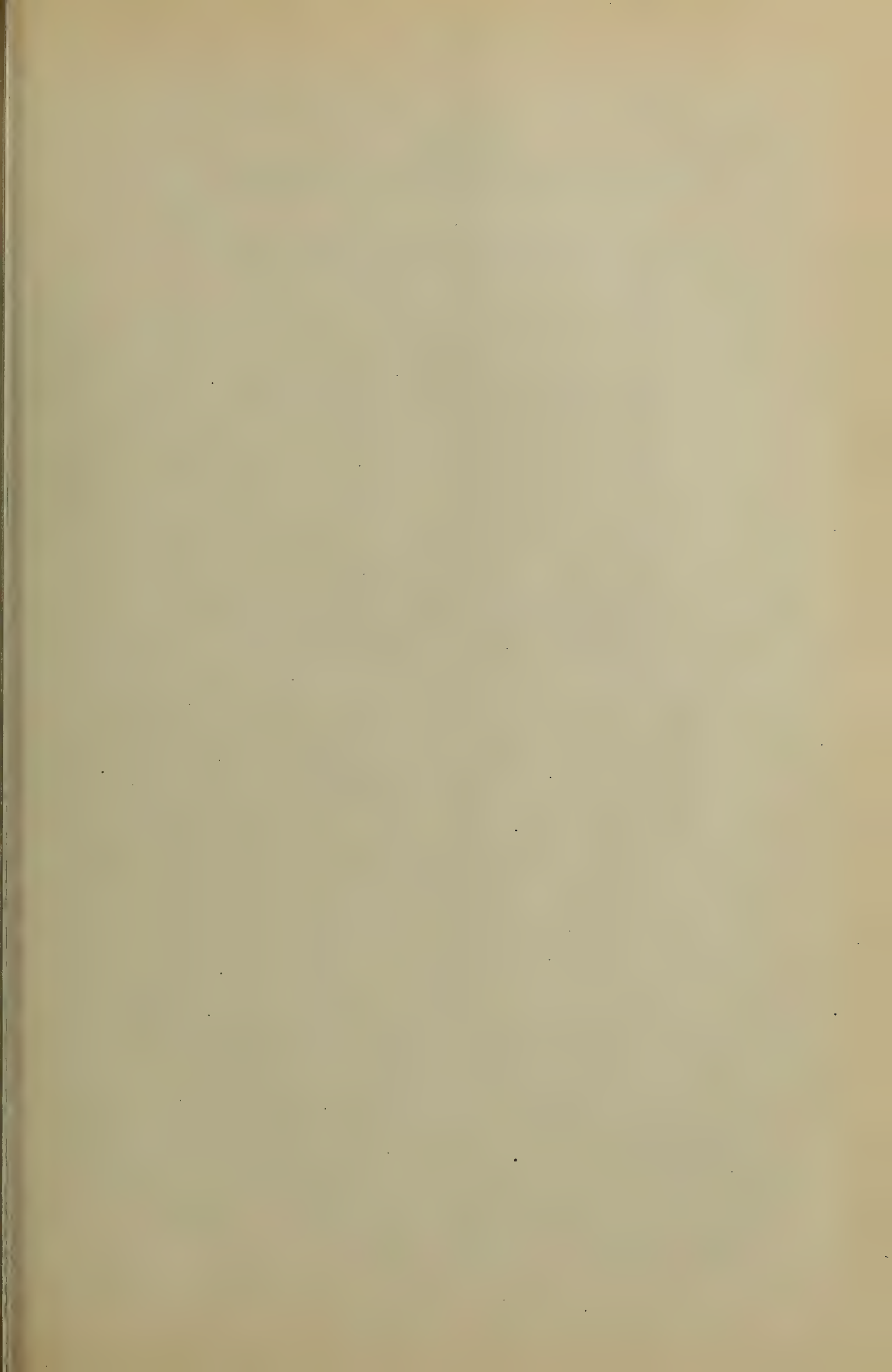


Fig. 1.

WITNESSES=

E. B. Tomlinson.
G. A. Higgins.

INVENTOR=
John Stone Stone
by Browne & Woodward
his attorneys.



J. S. STONE.

DEVICE FOR AMPLIFYING ELECTRICAL CURRENTS.

APPLICATION FILED MAY 23, 1906.

2 SHEETS—SHEET 2.

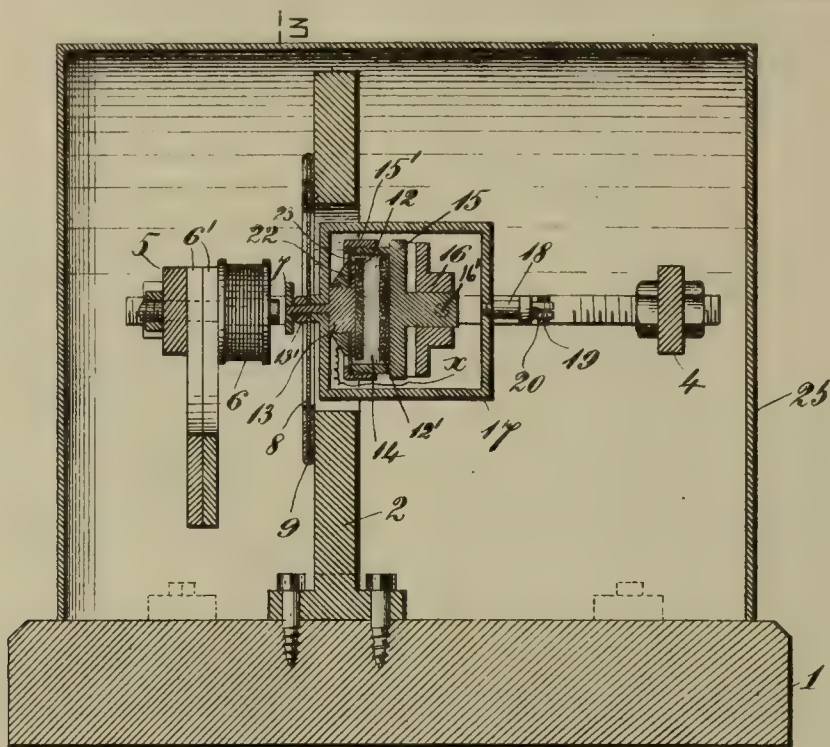


FIG. 2.

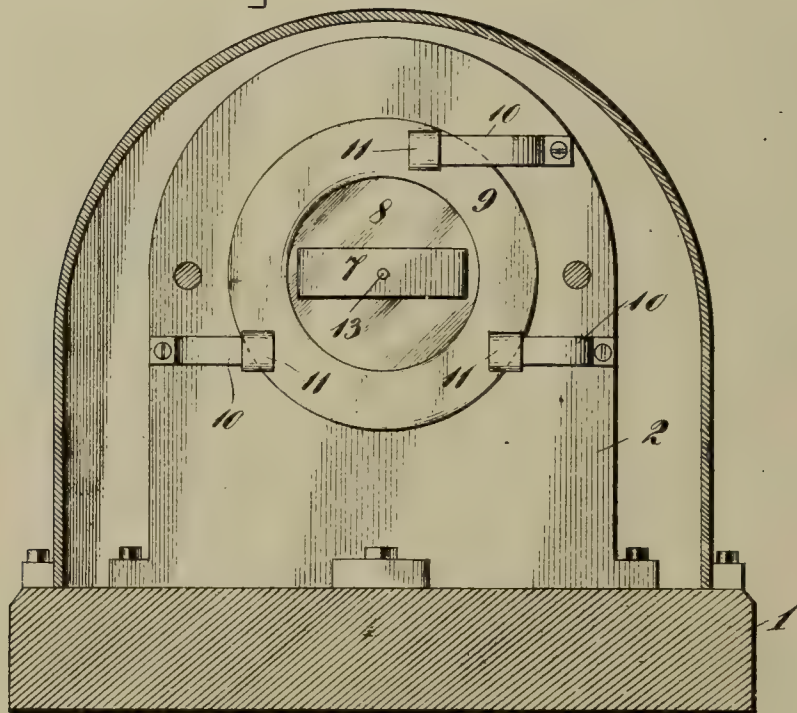


FIG. 3.

WITNESSES=

E. B. Tomlinson.
G. A. Higgins.

INVENTOR=

John Stone Stone
by Brown & Woodworth
his attorneys.

UNITED STATES PATENT OFFICE.

JOHN STONE STONE, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO JOHN A. CHRYSTIE, LOUIS DUNCAN, AND WALTER H. TURNER, ALL OF NEW YORK, N. Y.

DEVICE FOR AMPLIFYING ELECTRICAL CURRENTS.

No. 854,120.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed May 23, 1906. Serial No. 318,305.

To all whom it may concern:

Be it known that I, JOHN STONE STONE, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Devices for Amplifying Electrical Currents, of which the following is a specification.

My invention relates to devices for amplifying electrical currents, however produced, which vary in accordance with the sonorous vibrations accompanying vocal or other sounds, and it relates more particularly to devices of such character which are adapted to amplify without distortion the currents, and hence the sounds produced by telegraphones.

The primary object of my invention is to produce a device for amplifying such electrical currents, in which the diaphragm or armature which is actuated by said currents and which in turn serves to actuate the movable electrode of a microphonic transmitter is maintained in a condition of stable equilibrium; and a secondary object of my invention is to provide a device for amplifying without distortion the currents, and hence the sounds, produced by telegraphones.

With these objects in view my invention consists in a device for amplifying electrical currents, in which a diaphragm or armature and the movable electrode of a microphonic transmitter are maintained in a condition of stable equilibrium between a magnetic force and an opposing mechanical force which varies for all positions of said diaphragm and electrode directly as said magnetic force, and such mechanical force may, with a sufficient degree of approximation, be applied by an elastic member the tension of which increases as the square of its deflection.

My invention may best be understood by having reference to the drawings which accompany and form a part of this specification, and which illustrate one form of apparatus and arrangement of circuits whereby the hereinbefore mentioned objects may be carried into effect, although it is to be understood that I do not limit myself to the particular embodiments therein illustrated inasmuch as many modifications may be made both in the apparatus and in the circuit arrange-

ments without departing from the principle of my invention.

In the drawings, Figure 1 is a plan view of my invention, showing the circuit arrangements in diagram. Fig. 2 is a longitudinal section taken on the line 2—2 of Fig. 1. Fig. 3 is a cross section taken on the line 3—3 of Fig. 2.

In the drawings, D D' represent rollers on which the magnetizable wire C is wound. By mechanisms which are now well known and which form no part of my invention, the magnetizable wire C has its magnetism modified in accordance with the sonorous vibrations which accompany vocal or other sounds and is moved past the electromagnet A, being maintained always closely adjacent to the core of said electromagnet. As is now well understood by those skilled in the art of telegraphones, the relative motion produced between said magnetizable member C and said electromagnet will produce feeble currents in the circuit of the solenoid which constitutes part of said electromagnet and if a telephone receiver be included in circuit with said solenoid sound waves will be produced corresponding more or less accurately to the original sonorous vibrations whereby the magnetism of the member C originally was varied. These sound waves, however, will be exceedingly minute, and although various attempts have been made to amplify the currents produced by telegraphones and the resulting sounds produced by said currents in telephone receivers, I am advised that as yet no such attempt has been commercially successful.

As shown in Fig. 1, the circuit of the solenoid which constitutes part of the electromagnet A, includes the serially-connected coils 6, 6 which surround cores secured to the permanent magnet 6', the cores of said coils and said permanent magnet being secured to the cross piece 5 of brass or other non-magnetic metal. In lieu of a telephone diaphragm operated upon by the magnetic flux created by the currents flowing in the coils 6 for reproducing as sonorous vibrations the electric vibrations developed in the circuit of the coils 6 by the motion of the magnetizable member C past the electromagnet A, I cause said flux to produce relative movements between the

electrodes 12 and 12' of a microphonic transmitter and associate in any suitable manner the sound-producing mechanism with the circuit which includes said electrodes and the carbon granules 14 which separate them.

In the particular embodiment of my invention which is shown in the drawings, the support 2 which may be of brass, is secured to the base 1, which may be of any suitable material, and carries the bolts 3, 3, which may be threaded through said support 2 and held in position by lock nuts. The cross piece 5 is secured to said bolts on one side of said support and the cross piece 4 is secured to the bolts on the other side of said support. The frame 16 to which the fixed electrode 12' and carbon-containing capsule 15 are secured is bolted to the frame 2 and affords means for connecting said fixed electrode to the binding post *c*. The movable electrode 12 is secured to the screw 13, and the screw 13 and aluminium frame 17 are secured to the diaphragm 8 by means of the nut 13'. The armature 7 of the electromagnet 6, 6 is threaded on the projecting end of the screw 13. A lock nut 15' is employed to secure the mica diaphragm 23 between the carbon containing capsule 15 and the nut 22. As shown more clearly in Fig. 1, the carbon containing capsule 15 is knurled for purposes of ready adjustment and when adjusted is secured in the frame 16 by a set screw 16'.

The diaphragm 8 may be secured to the support 2 by means of the springs 10 which carry rubber washers on their ends, and as shown the diaphragm 8 may have its periphery covered by a rubber washer 9 or other suitable material for insulating it from said support 2.

The wire *x* is secured to the insulating block 24 and is connected through the binding post *d* to the battery B and the primary I_1 of the transformer M. The wire *y* is connected to the frame 2, which as above stated, is conductively connected to the fixed electrode 12' through the frame 16. As most clearly shown in Fig. 2, the wire *x* is conductively connected to the movable electrode 12 through the intermediary of the lock nut 22 and the screw 13. The wire *y* is then connected through the binding post *c* to the primary of the transformer M, thus completing the circuit through the two electrodes 12, 12', the carbon granules 14, battery B and the primary of the transformer M.

In lieu of employing an electromagnet connected in series with the coils 6, 6 for the purpose of retracting the diaphragm 8 and its attached electrode 12, I use a mechanical retracting means consisting of an elastic member 20 so tensioned that the force exerted by it to move the electrode 12 back to its normal position varies directly over a wide range of positions of said electrode approximately as the force exerted thereon by the electromag-

nets 6, 6. For this purpose a wire 20 secured to the extension 18 of the frame 17 by the nut 19 may be employed, and its tension may be adjusted by the adjusting screws 20' which are threaded through the bolts 3, 3. When said wire is so constructed and arranged that its tension varies as the square of its deflection, it will be evident that the movable electrode 12 and the moving parts secured thereto are in a condition of stable equilibrium, for the force exerted on said movable electrode by the electromagnets 6, 6 varies inversely as the square of the separation of the armature 7 from the cores of said electromagnets. By thus maintaining the movable electrode in a condition approximating closely that of stable equilibrium during the operation of the apparatus, it will be apparent that during such operation of said apparatus the only work required to be done by the magnetic flux developed in the electromagnets 6, 6 is the overcoming of the inertia of the movable electrode 12 and its connected moving parts as distinguished from the overcoming of the inertia of said parts and a retractile force. In this manner, the variations effected in the resistance of the circuit of the battery B and microphonic transmitter are greatly amplified with the result that the sounds produced by a telephone receiver included in said circuit are much louder than they would be were the usual magnetic retractile force employed in lieu of the member 20 and also distortion is greatly diminished. Instead of connecting the telephone receiver directly in the circuit of the battery B and microphonic transmitter, I prefer to connect said telephone receiver T in series with the secondary I_2 of the step-up transformer M, the primary of which is included in series with the battery B and microphonic transmitter, inasmuch as such arrangement results in a still further amplification.

By inclosing the apparatus in the bell-jar 25 and evacuating said jar, as by an air pump attached to the orifice 21, the movement of the electrode 12 which is effected by the feeble magnetic forces which operate upon the armature 7 may be increased on account of the resulting reduction of friction, and the current variations created in the circuit of the battery B may be correspondingly amplified. For the purpose of maintaining the vacuum in the bell-jar 25, the binding posts *a b c d*, may extend through the base 1 and the external circuits of the magnets 6, 6 and the microphonic transmitter may be connected to the lower ends of said binding posts as indicated in the dotted lines in Fig. 1.

I claim—

1. In an apparatus for amplifying electric currents varying in accordance with sonorous vibrations, a microphonic transmitter com-

prising a fixed and a movable electrode, magnetically operated means for moving said movable electrode in one direction and mechanical means for moving said electrode in the opposite direction, said mechanical means being so constructed that its tension varies as the square of its deflection.

2. In an apparatus for amplifying electric currents varying in accordance with sonorous vibrations, a microphonic transmitter comprising a fixed and a movable electrode and means maintaining said movable electrode in a condition of stable equilibrium during the operation of the apparatus.

3. In an apparatus for amplifying electric currents varying in accordance with sonorous vibrations, an armature, a microphonic transmitter comprising a fixed and a movable electrode, means securing said movable electrode to said armature, magnetic means for actuating said armature, and mechanical means secured to said movable electrode and exerting thereon a force in opposition to the force exerted thereon by said magnetic means, said mechanical means being so constructed that the force exerted thereby on said movable electrode varies for all positions of said electrode directly as the force exerted thereon by said magnetic means.

4. In an apparatus for amplifying electric currents varying in accordance with sonorous vibrations, a microphonic transmitter com-

prising a fixed and a movable electrode, an armature secured to said movable electrode, magnetic means for moving said movable electrode in one direction, and an elastic member secured to said movable electrode for moving the same in the opposite direction, said elastic member being so constructed that the force exerted thereby on said movable electrode varies for all positions of said electrode directly as the force exerted thereon by said magnetic means.

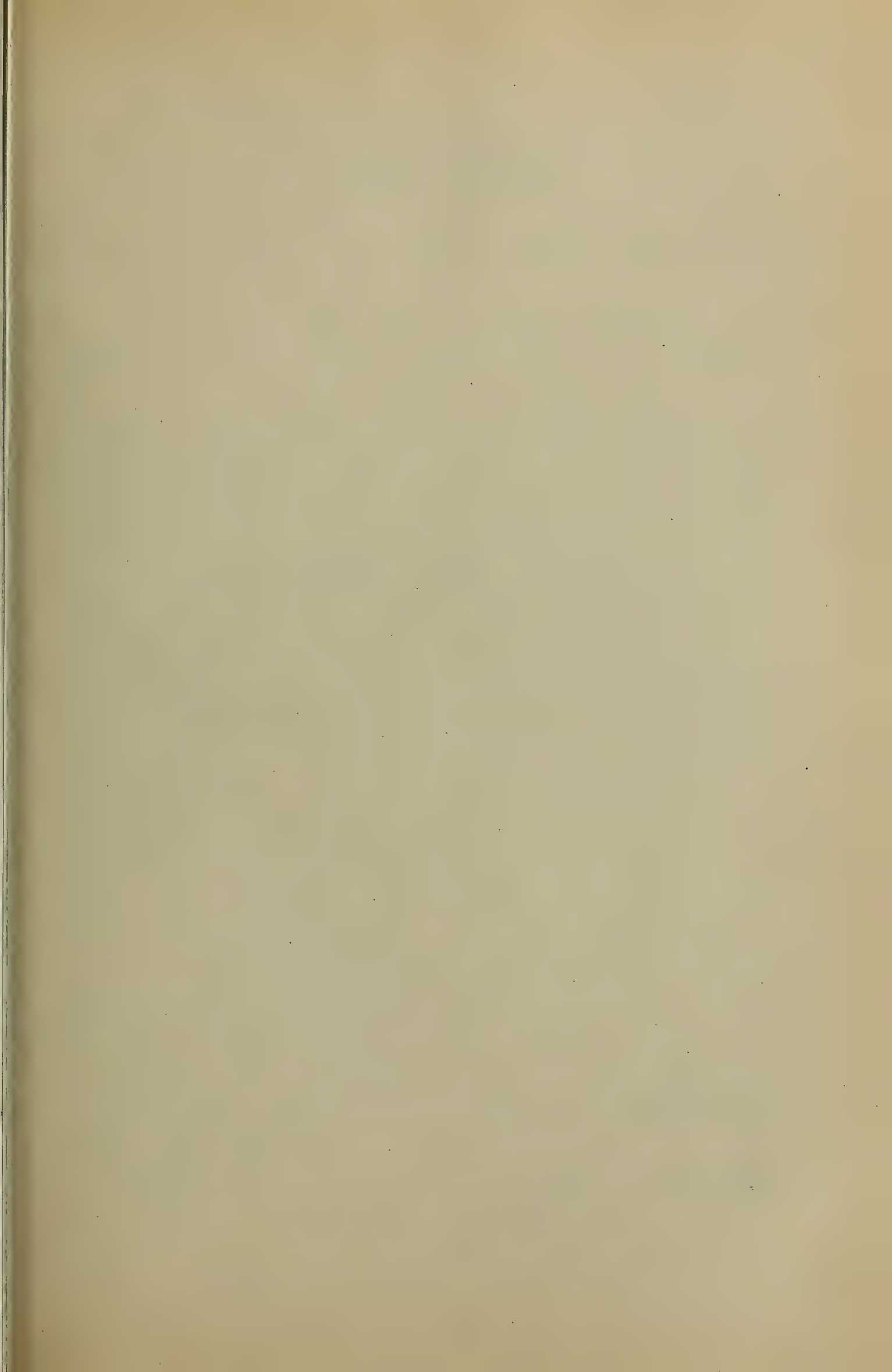
5. In an apparatus for amplifying electric currents varying in accordance with sonorous vibrations, a microphonic transmitter comprising a fixed and a movable electrode, an armature secured to said movable electrode, magnetic means for moving said electrode in one direction and a wire secured to said movable electrode for moving the same in the opposite direction, said wire being so tensioned that the force exerted thereby on said movable electrode varies for all positions of said electrode directly as the force exerted thereon by said magnetic means.

In testimony whereof, I have hereunto subscribed my name this 17th day of May 1906.

JOHN STONE STONE.

Witnesses:

GEO. K. WOODWORTH,
E. B. TOMLINSEN.



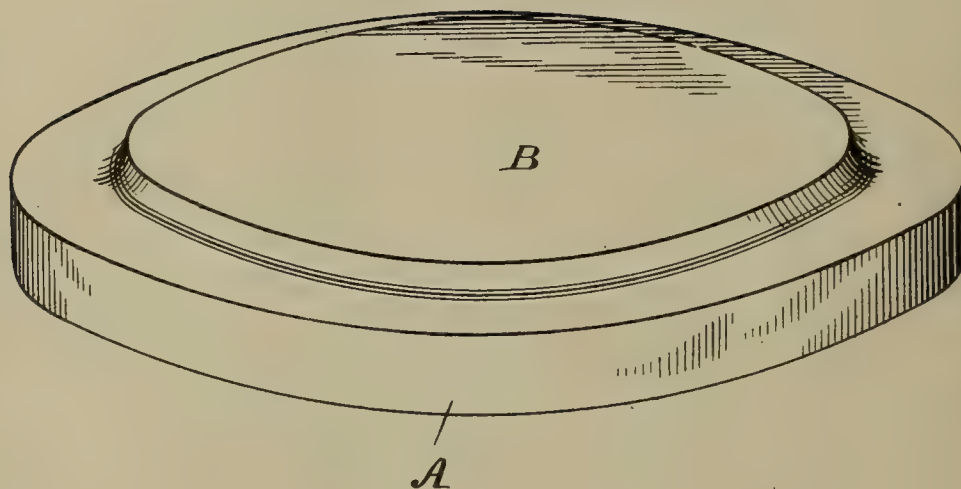
No. 854,801.

PATENTED MAY 28, 1907.

G. K. CHENEY.

COMPOSITION OF MATTER FOR SOUND RECORDS.

APPLICATION FILED JUNE 8, 1903.



WITNESSES:
Frank Comer

R. H. Humphrey

INVENTOR

George K. Cheney

BY

H. Walckenaer

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

COMPOSITION OF MATTER FOR SOUND-RECORDS.

No. 854,801.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed June 6, 1903. Serial No. 160,432.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Composition of Matter for Sound-Records, of which the following is a specification.

My invention relates generally to sound record tablets and is more specifically designed to produce a composition of matter for use as a recording surface or record tablet for talking machines. For this purpose, it is desirable that such a material should be perfectly amorphous and sufficiently hard and tough to permit ordinary handling and resist changes in temperature. At the same time, it must not be too brittle, as this property tends to cause it to crack, chip and break unevenly under the action of the cutting style, which results in mutilating the record and gives rise to harsh unpleasant sounds on reproduction. The material should furthermore be of such texture and possess sufficient coherence to permit a sharp clean cut to be made in the surface thereof and the shavings as formed, to be readily removed, without any tendency to become sticky and adhere to the record, recorder, etc.

I obtain a composition possessing the various essential properties and characteristics above pointed out, by combining equal parts of ozocerite and paraffin. Such a composition I find to be tough and smooth in texture. The shaving formed by the recording point is continuous and does not break into bits and stick to the surface of the record or clog the point of the stylus. The record groove is clean cut and the walls or surface thereof are smooth and entirely free of inequalities.

The accompanying drawing illustrates a common form of record tablet, such as is ordinarily employed in practice.

The tablet may be formed throughout of the composition or the body A, thereof may be of a different material and coated to a suitable depth with the composition to form a record surface B.

In carrying out my invention, I take ozocerite and paraffin in suitable proportions, preferably about equal parts, and reduce or concentrate the same by the application of heat. As the material melts, the temperature is gradually increased, until the boiling point is reached and it is thereafter raised to 350 or 400° Fahrenheit and continued for an hour or more, or until, on test, it exhibits the required degree of hardness, toughness, etc. It is then poured into molds conforming to the desired shape of the record blanks or tablets and allowed to cool and harden. Upon being removed from the molds, the surface B, of the blank is trued up to receive the sound record.

Having, therefore, described my invention, I claim:

1. A record tablet having a recording surface consisting essentially of a composition of ozocerite and paraffin in suitable proportions.

2. A record tablet consisting essentially of a composition of equal parts of ozocerite and paraffin.

Signed at New York, N. Y. this 4th day of June, 1903.

GEORGE K. CHENEY.

Witnesses:

J. E. PEARSON,
W. H. PUMPHREY.

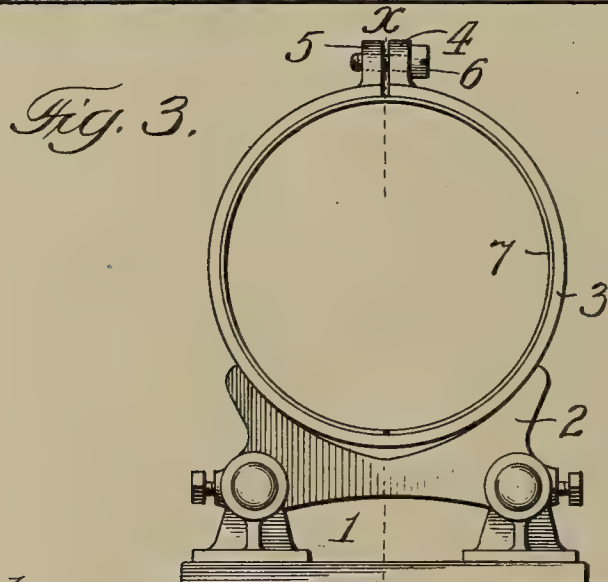
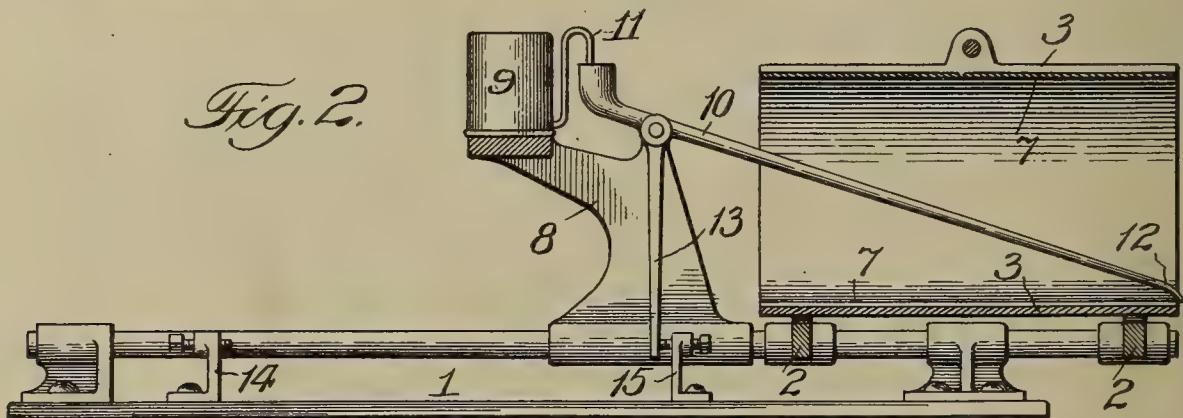
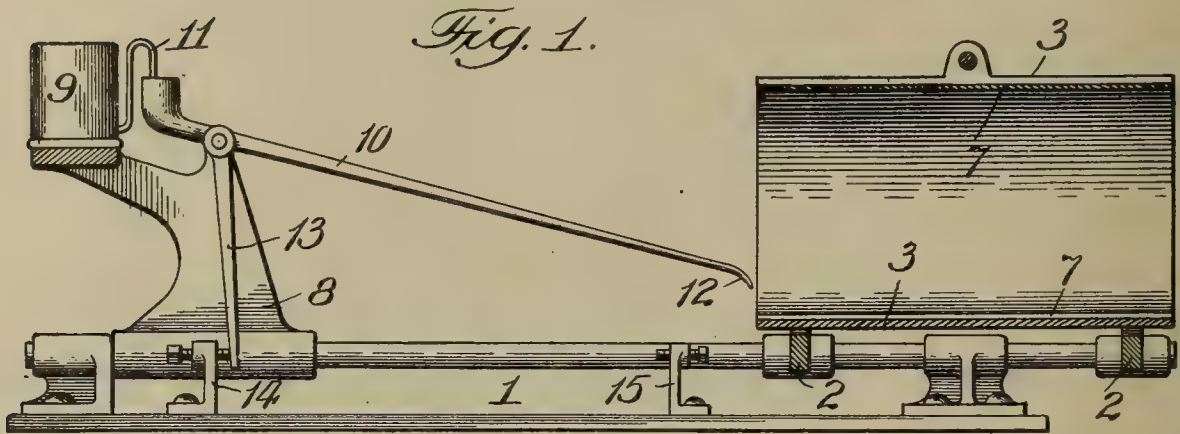
No. 854,886.

PATENTED MAY 28, 1907.

V. M. HARRIS.

MANUFACTURE OF CYLINDRICAL PHONOGRAPH RECORD BLANKS.

APPLICATION FILED OCT. 13, 1906.



Attest:
John Enders.
Henry Woe.

X

Inventor:
V. M. Harris.
by Robert A. Harris
Attorney.

UNITED STATES PATENT OFFICE.

VARIAN M. HARRIS, OF CHICAGO, ILLINOIS.

MANUFACTURE OF CYLINDRICAL PHONOGRAPH RECORD-BLANKS.

No. 854,886.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed October 13, 1906. Serial No. 338,727.

To all whom it may concern:

Be it known that I, VARIAN M. HARRIS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Cylindrical Phonograph Record-Blanks, of which the following is a specification.

This invention relates to means for forming cylindrical phonograph record blanks from sheets of celluloid, and has for its object to provide a simple and efficient structural arrangement and combination of parts whereby the sheet of material bent into a cylindrical form is securely held and united by a longitudinally extending cemented seam to form a cylindrical blank equal in all respects to the drawn tubes or cylinders heretofore used in the manufacture of phonograph records, all as will hereinafter more fully appear.

In the accompanying drawings:—Figure 1 is a longitudinal sectional elevation, on line $x-x$, Fig. 3, of an apparatus embodying the present invention, and showing the parts in the position in which the carriage has completed an active stroke. Fig. 2 is a similar view showing the parts in the position for the commencement of an active stroke. Fig. 3 is an enlarged end elevation.

Similar numerals of reference indicate like parts in the different views.

Referring to the drawings, 1 represents a stationary slideway of any usual construction, and provided with suitable feet by which it is supported in a horizontal position upon a work bench or table.

2 are a plurality of saddle pieces secured in fixed relation to the slideway 1, and adapted to support the cylindrical work holder in proper position in the apparatus.

3 is the cylindrical work holder above referred to, and consisting of a cylindrical shell of metal, or other equivalent rigid material, slitted along its length to form the longitudinal opening or gap 4 in the wall of the holder as shown.

5 are ears upon the opposed edges of the gap 4, through which pass adjusting screws 6, by which an adjustment in the diameter of the holder can be effected as required in the actual and continued use of the apparatus.

7 is the sheet of celluloid to be operated on, and which is bent into a cylindrical form

and inserted into the interior of the cylindrical holder 3, with the meeting edges and seam formed thereby, located at the under side of the blank celluloid cylinder so formed, and as shown more particularly in Fig. 3.

8 is a carriage sliding longitudinally on the slideway 1, and carrying a supply tank 9 in which is contained a supply of the cementing fluid used in the practical operation of the apparatus, and which fluid will usually consist of a cellulose product dissolved in ether.

10 is a fountain pen pivotally supported on the carriage 8, and having one end connected by a flexible tube 11, with the supply tank 9, while its other end is of an elongated form and ends in a capillary discharge point 12 through which the cementing fluid flows, as said point moves in contact with the work.

13 is a depending operating arm rigidly connected to the fountain pen 10, aforesaid.

14 and 15 are stationary stops arranged near the limit of the longitudinal travel of the carriage 9, in each direction, and which are adapted to alternately contact with the arm 13 to raise the discharge point 12 from the work, at the ending of its active stroke, and in like manner depress said discharge point at the ending of its inactive stroke and previous to the beginning of the active stroke; such operations taking place in an automatic manner during a continued operation of the apparatus.

The operation of the apparatus is as follows:—A sheet of celluloid of the proper dimensions is bent into a cylindrical form and inserted in the interior of the cylindrical work holder 3, which is adjusted to the required diameter by the adjusting screws 6. The work holder is then placed in position on the saddle pieces 2, with the seam of the celluloid cylinder located at the lowermost point in the height of said cylinder as shown. The operator now moves the carriage 8 to bring the discharge point 12 of the fountain pen 10 to the rear end of the interior of the work and work holder, as illustrated in Fig. 2, and as such position is reached the stop 15 contacts with the arm 13 to automatically depress the discharge point 12 to an operative position. A return movement is now imparted to the carriage and the discharge point 12 is drawn along the longitudinal seam of the celluloid cylinder 7 to deposit the cementing solution; with the ending of such ac-

tive or return stroke of the carriage, the stop 14 contacts with the arm 13 to automatically raise the discharge point 12 into its normal inoperative position. The work holder with
 5 its contained cylinder of celluloid, is now removed from the apparatus and stacked away to dry out, and is replaced by a succeeding holder and its contained sheet of celluloid, the system requiring a large number of coun-
 10 terpart work holders in the attainment of rapid and perfect work.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:—

15 1. In an apparatus for forming sheet celluloid into cylindrical phonograph record blanks, the combination of a cylindrical work holder adapted to maintain a sheet of celluloid in a cylindrical form, means for sup-
 20 porting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage moving on said slideway, and a fountain pen carried by said carriage.

25 2. In an apparatus for forming sheet celluloid into cylindrical phonograph record blanks, the combination of a longitudinally slotted cylindrical work holder adapted to maintain a sheet of celluloid in a cylindrical
 30 form, means for effecting a change in the diameter of said work holder, means for supporting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage moving on said
 35 slideway, and a fountain pen carried by said carriage.

3. In an apparatus for forming sheet celluloid into cylindrical phonograph record blanks, the combination of a cylindrical
 40 work holder adapted to maintain a sheet of celluloid in a cylindrical form, stationary saddle pieces for supporting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage mov-

ing on said slideway, and a fountain pen carried by said carriage. 45

4. In an apparatus for forming sheet celluloid into cylindrical phonograph record blanks, the combination of a longitudinally
 50 slotted cylindrical work holder adapted to maintain a sheet of celluloid in a cylindrical form, stationary saddle pieces for supporting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage moving on said slideway, 55
 and a fountain pen carried by said carriage.

5. In an apparatus for forming sheet celluloid into cylindrical phonograph record blanks, the combination of a cylindrical
 60 work holder adapted to maintain a sheet of celluloid in a cylindrical form, means for supporting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage moving on said slideway, a supply tank on said carriage, a piv- 65
 oted fountain pen carried by said carriage and connected with said tank, and means for tilting said pen near the ends of its travel.

6. In an apparatus for forming sheet celluloid into cylindrical phonograph record
 70 blanks, the combination of a longitudinally slotted cylindrical work holder adapted to maintain a sheet of celluloid in a cylindrical form, means for effecting a change in the diameter of said work holder, means for sup- 75
 porting the work holder in a horizontal position, a slideway arranged longitudinal to the work holder, a carriage moving on said slideway, a supply tank on said carriage, a piv- 80
 oted fountain pen carried by said carriage and connected with said tank, and means for tilting said pen near the ends of its travel.

Signed at Chicago, Illinois this 10th day of October 1906.

VARIAN M. HARRIS.

Witnesses:

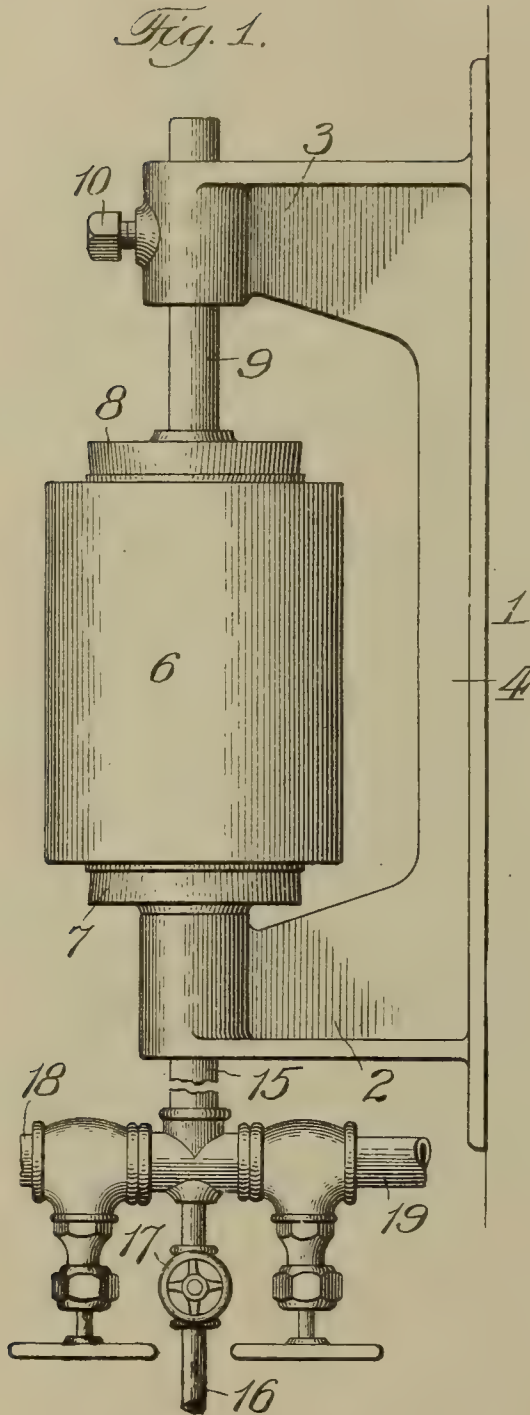
ROBERT BURNS,
 HENRY MOE.

No. 854,887.

PATENTED MAY 28, 1907.

V. M. HARRIS.
MOLDING PHONOGRAPH RECORDS.
APPLICATION FILED OCT. 13, 1906.

Fig. 1.



Attest:
John Enders.
Henry Moore.

Fig. 2.

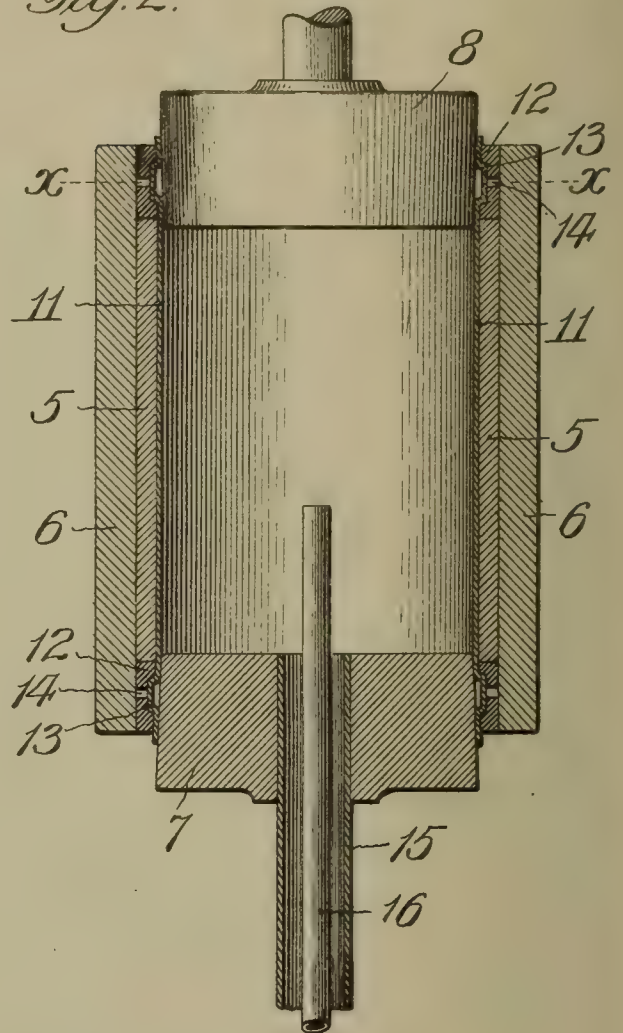
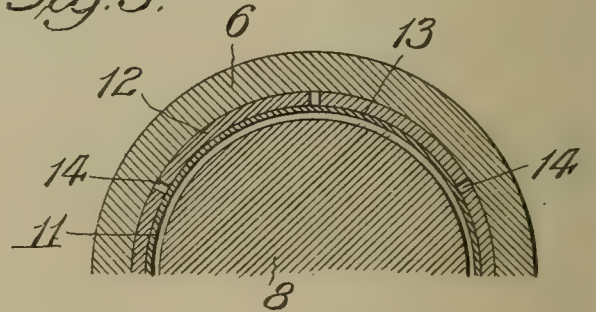


Fig. 3.



Inventor:
V. M. Harris.
by Robert Burns
Attorney.

UNITED STATES PATENT OFFICE.

VARIAN M. HARRIS, OF CHICAGO, ILLINOIS.

MOLDING PHONOGRAPH-RECORDS.

No. 854,887.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed October 13, 1906. Serial No. 338,728.

To all whom it may concern:

Be it known that I, VARIAN M. HARRIS, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Molding Phonograph-Records, of which the following is a specification.

This invention relates to that class of molding apparatus for cylindrical phonograph records, in which a blank cylinder of celluloid or the like is expanded by elastic fluid pressure and in the presence of heat into the interior of a properly formed cylindrical matrix; and the present improvement has for its object to provide a simple and efficient structural formation and combination of parts whereby a very effective sealing is attained at the respective ends of the cylindrical blank during the molding operation, all as will hereinafter more fully appear.

In the accompanying drawings:—Figure 1 is a side elevation illustrating the general arrangement of parts of the present molding apparatus. Fig. 2 is an enlarged central detail section of the mold portion, having the present invention applied. Fig. 3 is a detail transverse section of the same, on line $x-x$, Fig. 2.

Similar numerals of reference indicate like parts in the different views.

Referring to the drawings, 1 represents the stationary supporting frame or housing of the apparatus, and which in the construction shown in the drawing comprises upper and lower horizontal members 2 and 3, integrally connected together by a vertical member 4, adapted for attachment to a wall or post.

5 is the matrix of the apparatus, having a hollow cylindrical form, open at both ends, and provided on its inner surface with sound record indentations as usual in the present type of matrices or molds.

6 is a shell of metal encircling the matrix 5, and adapted to afford strength and stiffness to the matrix in actual use; in the present improvement such shell has a greater length than the matrix, for the purpose hereinafter stated.

7 is the stationary closure head for the lower end of the mold or matrix aforesaid, and is supported in a stationary condition upon the upper side of the lower member 2 of the main frame by any usual means, preferably however by a pipe connection hereinafter described.

8 is the removable end closure head for the upper end of the mold or matrix aforesaid, of a counterpart form to the stationary closure head 7, and is provided with a central guide stem 9 adapted to fit a vertical guide bore in the upper horizontal member 3 of the main frame, and have vertical adjustment therein in a direction to and from the upper end of the matrix.

10 is a clamping screw or other equivalent fastening means for securing the removable end head 8 and guide stem 9 at the required adjustment.

In the present construction the end closure heads 7 and 8 are formed with tapering peripheries as shown, so as to have a wedging fit in the interior of the respective ends of the cylindrical phonograph record blank 11, to form pressure tight joints at such points.

12 are floating rings arranged at the respective ends of the matrix 5 in receiving cavities formed by the extensions of shell 6 beyond the matrix; the fit between said ring and the described parts being a loose one to permit of the passage of any confined air in the practical operation of the apparatus.

13 are annular channels formed in the interior of the floating rings 12, and into which the end portions of the cylindrical phonograph record blank 11 are adapted, under the internal pressure existing in actual use, to be found in the form of annular beads, to constitute a very efficient pressure tight joint at such points.

14 are one or more radial passages extending outward from the annular channels 13 to permit of the ready passage therefrom of the air contained therein, as the joints above referred to are forming.

15 is a vertical inlet pipe, the upper end of which is fixedly secured in a central bore in the stationary closure head 7, aforesaid.

16 is a small vent pipe arranged centrally in the inlet pipe 15, and provided with a controlling valve 17 as shown.

18 is a valved branch pipe connecting with the inlet pipe 15 and adapted to introduce from a suitable source a pressure of steam into the interior of the apparatus. 19 is a secondary valved branch pipe also connecting with the inlet pipe 15, and adapted to introduce from a suitable source a pressure of air for use in the drying, cooling and shrinking of the molding process, as hereinafter more fully set forth.

The operation of the present apparatus is

as follows:—The cylindrical phonograph record blank 11 is first inserted in the interior of the matrix 5, after which the ends thereof are closed by the insertion of the tapering closure heads 7 and 8 to form a pressure tight chamber, of which the phonograph record blank and the opposed closure heads form the encompassing walls. Steam pressure is now admitted to said pressure chamber, to first expel the air contained therein through the vent pipe 16, after which the valve 17 in said pipe is closed and the steam pressure maintained for a sufficient period of time to cause a softening of the walls of the phonograph record blank and the molding thereof into the indentations of the matrix 5. The steam pressure is then shut off, and a supply of air introduced to dry out the interior of the phonograph record blank, and with such drying operation effect a cooling and shrinkage of the same, so that the finished phonograph record can be readily removed for subsequent mounting upon a suitable submandrel.

25 Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an apparatus for molding cylindrical

phonograph records, the combination of a matrix having an indented cylindrical bore, 30 a pair of tapering heads closing the respective ends of the matrix chamber, and floating rings arranged at the respective ends of the matrix and provided with internal annular channels adapted to form pressure tight joints with the ends of the cylindrical phonograph blank operated on. 35

2. In an apparatus for molding cylindrical phonograph records, the combination of a matrix having an indented cylindrical bore, 40 a pair of tapering heads closing the respective ends of the matrix chamber, and floating rings arranged at the respective ends of the matrix and provided with internal annular chambers adapted to form pressure tight joints with the ends of the cylindrical phonograph blank operated on, the said grooves having radial exit passages for the escape of air therefrom. 45

Signed at Chicago, Illinois this 10th day of 50 October 1906.

VARIAN M. HARRIS.

Witnesses:

ROBERT BURNS,
HENRY ULOE.

No. 855,116.

PATENTED MAY 28, 1907.

C. M. MILLER.
TALKING MACHINE ATTACHMENT.

APPLICATION FILED JAN. 18, 1907.

Fig. 1.

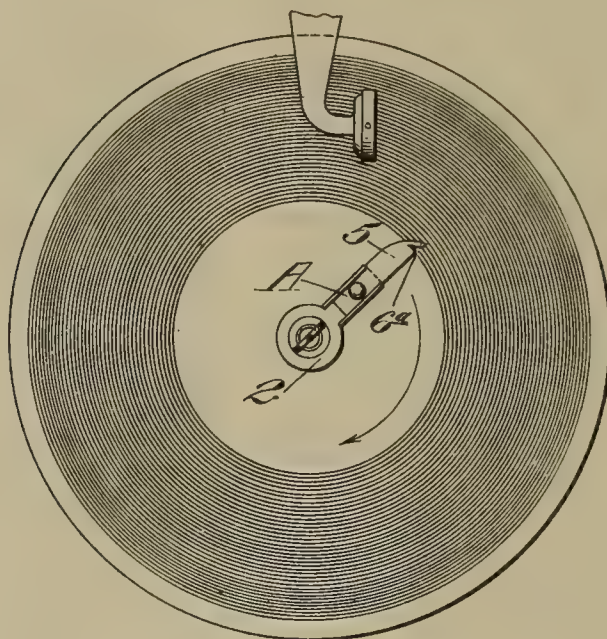


Fig. 2.

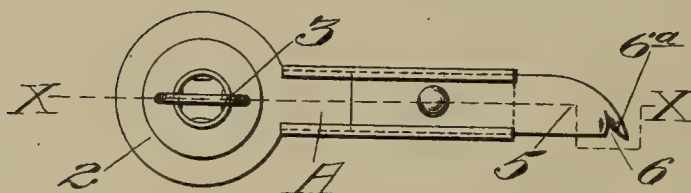
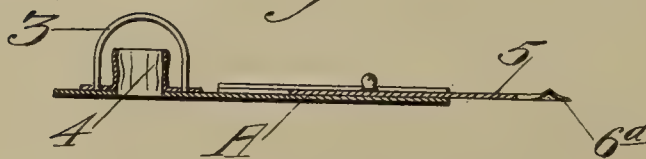


Fig. 3.



WITNESSES:

J. Eastberg.
J. H. Source

INVENTOR

Charles M. Miller.

BY

Geo. H. Strong.

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES M. MILLER, OF ALAMEDA, CALIFORNIA.

TALKING-MACHINE ATTACHMENT.

No. 855,116.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed January 18, 1907. Serial No. 352,932.

To all whom it may concern:

Be it known that I, CHARLES M. MILLER, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

My invention relates to an attachment for talking machines, in which the records are of the disk class, and it is intended to protect the disks from injury after the finish of the piece.

It consists of the parts and the constructions and combinations of parts which I will hereinafter describe and claim.

Figure 1 is a partial plan view of a phonograph showing the attachment of my device. Fig. 2 is a plan view of same. Fig. 3 is a section on line X—X of Fig. 2.

In the operation of machines of this class, the disk having the record upon it is revolved beneath a point which is held with relation to the disk so as to follow the lines of the record. It is necessary to attend to the machine and lift the arm which carries the point out of contact with the disk as soon as possible after the finish of the piece that is being played, otherwise the points will sometimes jump and be thrown back on to the lines of the record so as to injure it.

It is the object of my invention to prevent such an accident, and it is effected as follows:

A is an arm projecting from a central hub or disk as at 2. This disk or hub has a hole through it which is adapted to fit the central vertical post of the machine, and for convenience may have a loop or handle 3 of any description by which it can be placed upon or removed from the post.

4 is a clamp which has sufficient adherence to the post to hold the arm A in a stationary position. This may be effected either by a piece of cork or rubber, or, as in the present case, a thin metal tube slitted vertically to form a series of elastic vertical ribs which will slightly clamp the post, and hold the arm in any position in which it may be placed sufficient to prevent its being displaced, but which will allow it to move around when the proper time arrives.

5 is a radially movable slide carried upon the arm A. To provide for this movement, the edges of the arm A may be turned over to form grooves in which the edges of the slide move with sufficient friction to hold the

slide at any point where it may be set. The outer end of this slide is curved or made to extend from what may be termed the rear edge toward the front edge. The arm and slide revolve in unison with the disk during the performance. This front edge has a small notch made in it, as at 6, the object of which is to catch and hold the pin which is following the record, after the piece has been completed.

The operation of the device will be as follows: The elastic sleeve is placed over the post, and the slide 5 is moved inwardly or outwardly upon the arm A until the point 6^a is just at the termination of the last circle of the record. The pin in the end of the arm to which it is attached, being let down upon the record at the outer edge as is customary, will follow the record until the piece is finished, at which instant it will arrive at the point 6^a, and just after the completion of the record, the pin will be engaged by this point and moved into the notch which thus holds it securely, and the pin will be prevented from jumping, or in other ways injuring the record.

I prefer to make the projecting point as thin as convenient, and to make a little upturned lip or edge 6^a at the side and bottom of the notch 6 to insure the engagement of the tone point.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a disk record talking machine, a radially projecting arm and a part slidably guided on said arm and having a notch in its outer end adapted to be engaged by the tone producing points after the record has been completed.

2. In a disk record talking machine, the combination of an arm provided with guides, means for attaching said arm to the central post of the machine, and a member slidable in the guides on said arm, and having its outer end notched to form a stop for the tone producing point when the record has been completed.

3. In a disk record talking machine, an arm, means by which said arm is attached to the central post with slight frictional hold, a radially slidable plate carried upon said arm, said plate having a terminal point and notch adapted to engage the tone-producing point after the completion of the record.

4. In a disk-record talking machine or the like, a radially adjustable arm, a socket by

which it may be attached to the central post,
with slight frictional adherence, a point and
notch at the outer end having an upturned
lip adapted to be engaged by the tone-pro-
5 ducing point upon its arrival at the end of the
record.

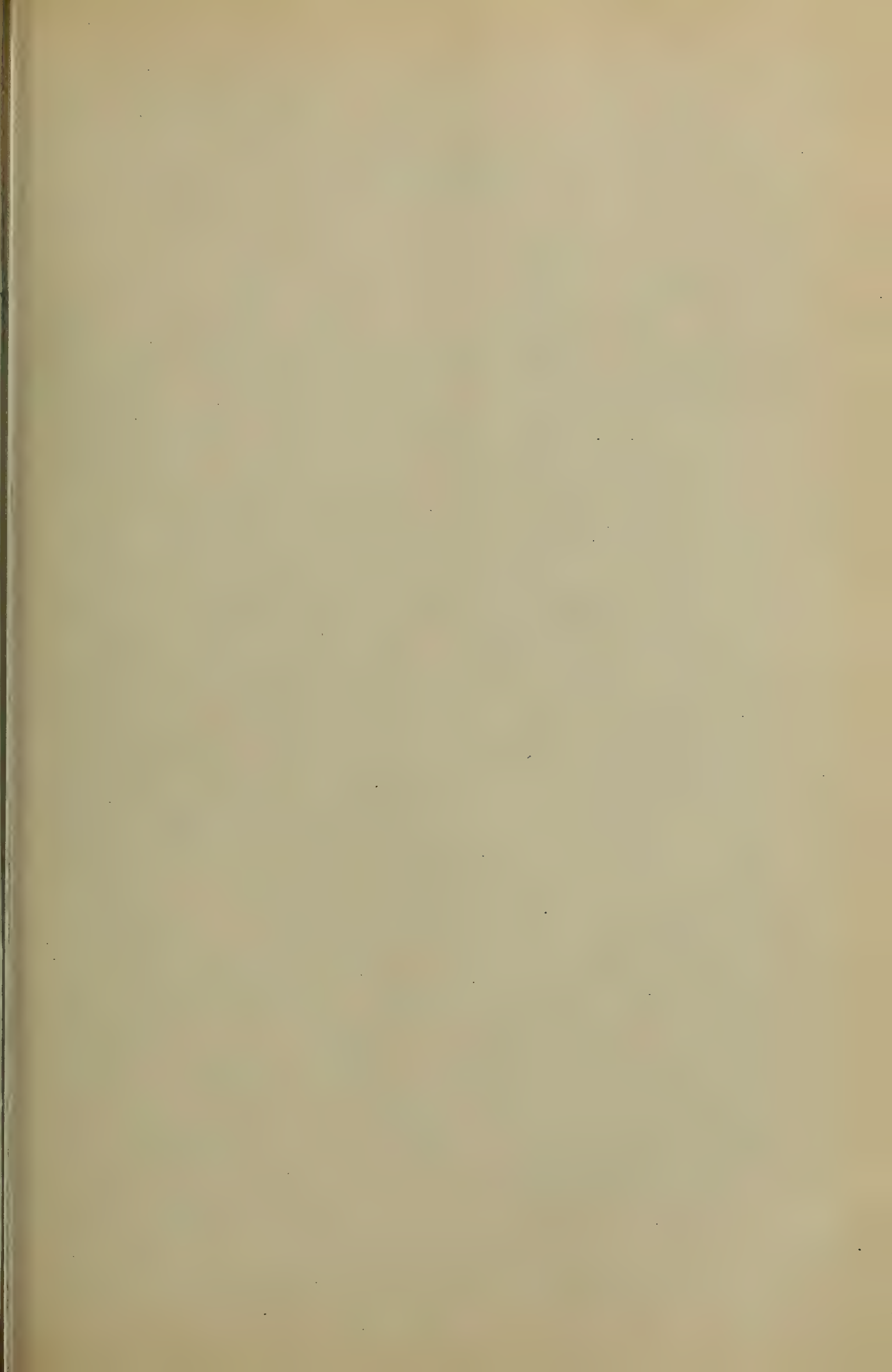
In testimony whereof I have hereunto set

my hand in presence of two subscribing wit-
nesses.

CHARLES M. MILLER.

Witnesses:

W. A. L. MILLER,
ANNIE L. MILLER.



No. 855,326.

PATENTED MAY 28, 1907.

E. H. MOBLEY.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JUNE 9, 1906.

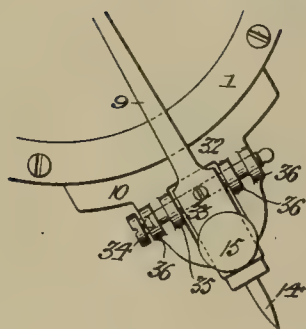
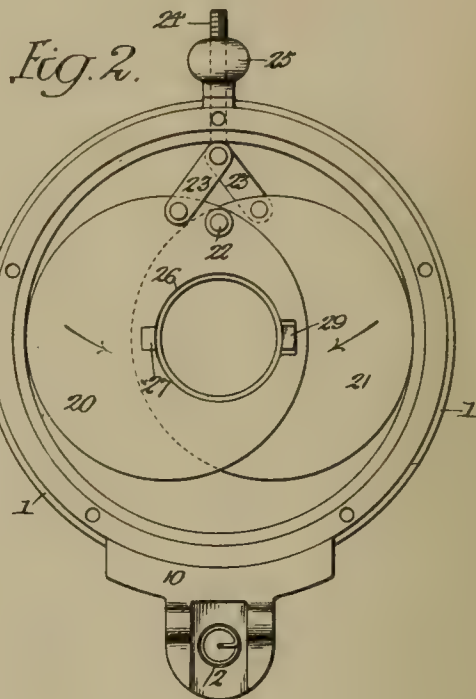
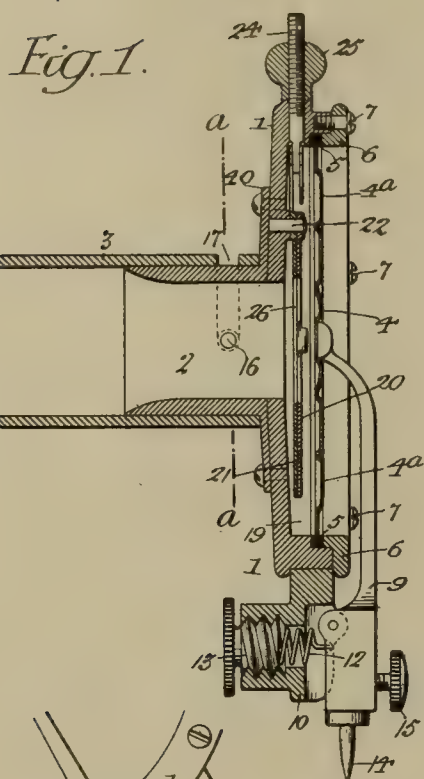
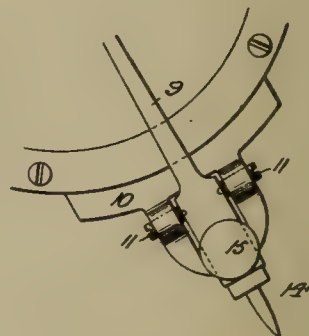
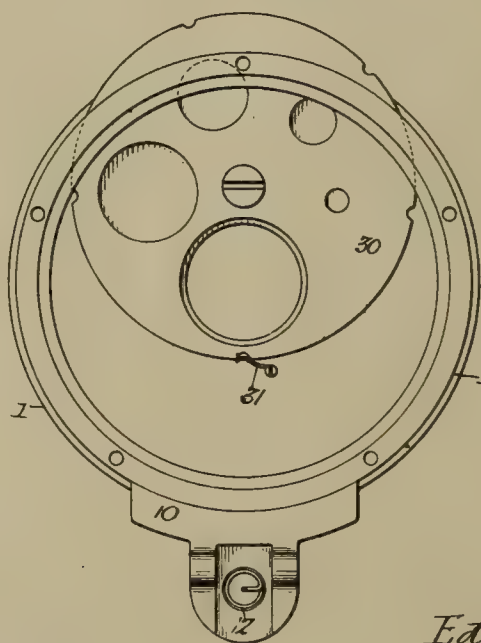
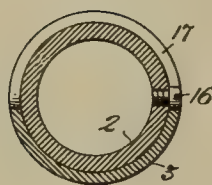


Fig. 5.

Fig. 6.

Fig. 3.

Fig. 4.



Witnesses:
Hamilton D. Dummer
Litus N. Gordo.

Inventor:
Edwin H. Mobley
by his Attorneys
Housman & Housman

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF RUTLEDGE, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 855,326.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed June 9, 1905. Serial No. 264,465.

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, a citizen of the United States, residing in Rutledge, Pennsylvania, have invented certain
5 Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to so construct a sound box for talking machines as to
10 insure a good reproduction of the record, to vary the area of outlet from the chamber beneath the diaphragm to accord with the character of the record which is being reproduced, and to permit ready access to the
15 stylus lever for the purpose of removing and replacing the stylus. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which

20 Figure 1, is a transverse section of a sound box for talking machines constructed in accordance with my invention; Fig. 2, is a front view of the same with the diaphragm and stylus lever removed; Fig. 3, is a front view
25 of the stylus lever mounting; Fig. 4, is a transverse section on the line *a—*a**, Fig. 1; Fig. 5, is a view illustrating a special form of stylus lever mounting; and Fig. 6, is a view illustrating a modification of one of the fea-
30 tures of the invention.

1 represents the cup-shaped sound box casing having at the back a tubular neck 2, which is rotatably mounted in the tubular sleeve 3, the latter being intended to carry
35 the horn, or other sound conveying or amplifying device, and being supported in any available manner, so as to maintain the sound box in its proper relation to the rotating plate or table which carries the disk record.

40 The neck 2 has a flange 40 to which the sound box casing is secured by screws or otherwise, so that said sound box can be readily applied to or removed from the support provided by the neck 2 and the sleeve 3
45 in which it is mounted, whereby different styles of sound boxes can be used in connection with the same machine, the change from one sound box to another, simply requiring the manipulation of a few screws and
50 being therefore, readily effected.

The mouth of the sound box casing is closed by a diaphragm 4, the edge of which is confined between rings 5 of rubber or other elastic or semi-elastic material, the inner-

most of these rings resting upon an annular
55 shoulder in the sound box casing, and the outer ring being confined by an annular, follower 6, which is secured to the sound box casing in any acceptable way, confining
60 screws 7 being used for this purpose in the present instance.

Bearing centrally upon the outer face of the diaphragm 4 is the inner end of the stylus lever 9, which is pivotally mounted upon a
65 projecting bracket 10 on the sound box casing 1, the method of pivoting shown in Figs. 1 and 3 being by means of pointed pivot pins 11, which are adapted to threaded openings in ears on the bracket 10 and engage with
70 conical recesses in the opposite sides of the stylus lever, as shown in Fig. 3.

In the underside of the stylus lever, at a point outwardly beyond the pivotal axis of the same, is a recess which receives the axi-
75 ally projecting upper end of a wire forming a coiled spring 12, whose base rests upon the inner end of a screw plug 13, which is adapted to a threaded opening in a boss on the bracket 10, so that, by the adjustment of this screw 13, the tension of the coiled spring
80 12 may be increased or diminished, and the degree of pressure exerted thereby upon the stylus lever may be correspondingly regulated.

The diaphragm 4 is annularly ribbed and
85 has a relatively thin outer section 4^a so as to impart to it a degree of resiliency not possessed by a flat diaphragm of uniform thickness and it has a normal tendency to press
90 outward against the inner end of the stylus lever 9, which tendency is resisted by the pressure of the spring 12, upon the outer arm of said stylus lever, hence both the lever and the diaphragm are constantly main-
95 tained in a condition of tension and better results are produced in the reproduction of sound, than if either of these parts was inert.

The provision of the coiled spring 12 with an axially projecting portion insures the
100 least possible amount of interference with the vibrations of the stylus lever, since the contact of the spring with said lever is limited to the bearing thereupon of the fine wire constituting the axial projection of the
105 spring, which may, if desired, be sharpened to a point, hence the character of the reproduction caused by the vibrations in the diaphragm under the action of the stylus lever

is not affected as it would be by the contact of a metallic body of large area with the underside of the lever.

The stylus 14 is adapted to a socket in the outer end of the stylus lever and is secured therein by a set screw 15, as usual, and in order to permit of ready access to said outer end of the stylus lever for the purpose of removing and replacing said stylus, the entire sound box can be rotated by turning the neck 2 of the same in the tubular support 3, so as to raise that portion of the sound box to which the stylus lever is pivoted, and carry the same away from the rotatable record holding disk, the pin 16, on the neck 2 being adapted to a segmental slot 17 in the tubular support 3, so as to limit both the upward and downward swinging movement of the sound box and insure the stoppage of the downward movement when the stylus lever bears its proper relation to the rotating record-carrying disk.

In instruments of the better class it is important to provide some means of regulating the area of outlet from the chamber 19 behind the diaphragm 4 to accord with the character of the record which is being reproduced, some records requiring larger apertures than others for the attainment of the best results in reproduction.

In order to accomplish such regulation I locate in the chamber 19 a pair of swinging diaphragms 20 and 21 pivoted to the back of the sound box at 22 and connected by links 23 to a screw stem 24, which passes through an opening in the annular wall of the sound box and has, on the outside of the latter, a nut 25.

Each of the diaphragms 20 and 21 has therein an aperture 26, and, when the diaphragms have been swung outward to their full extent, as shown in Fig. 2, these apertures coincide with each other and are concentric with the bore of the tubular neck 2 of the sound box, as there shown, but if the nut 25 is slackened and the screw stem 24 pushed inwardly the diaphragms 20 and 21 will be caused to swing upon their pivot in the directions of the arrows shown in Fig. 2, so as to carry their apertures out of line with each other and gradually decrease the area of opening provided thereby, the opening being fully closed before each diaphragm reaches the limit of its movement in the direction of its arrow.

When the aperture is fully closed I provide for the application of a damper to the diaphragm 4 so as to arrest or retard the vibrations of the same, such result being effected by mounting upon the diaphragm 20 a damper block 27 which, when the apertures 26 in the diaphragm are fully closed, is beneath the central portion of the diaphragm 4 and can be caused to bear against the same by the action of a wedge block 29 carried by

the diaphragm 21, this wedge block acting upon the underside of the diaphragm 20 at the edge of the aperture 26 therein, and imparting a slight lift to said diaphragm sufficient to cause its damper block 27 to press against the inner side of the diaphragm 4.

Instead of swinging diaphragms of the character described, a diaphragm of the "Iris" type, or a rotating diaphragm having a series of apertures of different diameters, such as frequently employed in connection with photographic lenses may be used. Such a rotating diaphragm is shown at 30, in Fig. 6, a portion of the diaphragm projecting through a slot in the annular wall of the sound box so as to permit it to be readily manipulated to bring any one of its apertures into line axially with the bore of the neck 2, a spring 31, or other suitable catch or retainer, being employed to prevent accidental movement of the diaphragm out of its adjusted position. In both forms, however, the means for varying the area of the outlet leading from the sound box are permanently located relatively to said outlet and are adapted to vary the area of said outlet coaxially therewith.

In that form of mounting for the stylus lever shown in Fig. 5, a pin 32 passes through the stylus lever and is secured thereto by a set screw 33, one end of this pin being pointed and adapted to bear upon the inner face of the head of a set screw 34 carried by the outermost of a pair of ears 35 at one side of the bracket 10, and the other end portion of the pin fitting snugly but so as to rotate freely in a pair of ears 36 at the opposite side of said pin, the weight of the stylus lever and its appurtenances being, in this case, borne mainly by the head of the set screw 34, and the bearings of the pin 32 in the inner ear 35 and in the ears 36 being mainly to steady the same.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. The combination of the sound box casing having a resilient diaphragm normally tending to press outwardly toward the stylus lever, a pivoted stylus lever against which said diaphragm exerts an outward pressure, and a spring acting upon the stylus lever, so as to exert thereupon a pressure in opposition to that of the diaphragm, substantially as specified.

2. The combination of the sound box casing and its diaphragm, a stylus lever pivoted to said sound box casing, and a spring having an axial extension bearing upon the stylus lever, substantially as specified.

3. The combination of the sound box casing and its diaphragm, the stylus lever pivoted to said casing and having a recess in one side of the same, and a spring having an axial extension adapted to said recess, substantially as specified.

4. In a sound box for talking machines, a diaphragm made in one piece having annular stiffening ribs, and formed with a relatively thinner portion between the two outer ribs.

5. The combination, in a sound box for talking machines, of the diaphragm, a casing supporting said diaphragm and having a projecting sound-carrying tube whose axial line is in the same direction as that of the diaphragm, and externally accessible and adjustable means for varying the area of the inner end of said tube, co-incidentally with the axis of said tube.

6. The combination, in a sound box for talking machines, of the diaphragm, a casing supporting said diaphragm and having a projecting sound-carrying tube whose axial line is in the same direction as that of the diaphragm, and an externally accessible and adjustable supplementary diaphragm structure located in the rear of the main diaphragm and serving to vary, co-incidentally with the axis of said tube, the area of the passage through the latter.

7. The combination of the sound box casing and its main diaphragm, with a pair of swinging diaphragms located in the chamber behind said main diaphragm, and each having an aperture therein and means for swinging each diaphragm upon its pivot so that it will gradually overlap and close the aperture in the other diaphragm.

8. The combination of the sound box casing and its main diaphragm, with a pair of diaphragms pivotally mounted in the chamber behind said main diaphragm and having apertures which, when said diaphragms are in one extreme position, are in line with each other and with the bore of the outlet neck of the sound box casing, and means for swinging said diaphragms upon their pivot so as to cause each to gradually overlap the aperture in the other, substantially as specified.

9. The combination of the sound box casing and its diaphragm, a damper for the latter,

and means, operating in the chamber behind said diaphragm, for varying the area of the outlet from said chamber and for forcing the damper into contact with the diaphragm, substantially as specified.

10. The combination, of the sound box casing and its diaphragm, a damper for the latter, and means operating in the chamber behind said diaphragm for gradually lessening the area of outlet from said chamber and for forcing the damper into contact with the diaphragm when such outlet is closed, substantially as specified.

11. The combination of the sound box casing and its main diaphragm, with a pair of apertured diaphragms pivoted in the chamber behind said main diaphragm, one of said pivoted diaphragms being provided with a damper block, and the other serving, when the diaphragms are moved so as to close their apertures, to cause said damper block to be pressed against the said main diaphragm, substantially as specified.

12. The combination of the sound box and its diaphragm, the stylus lever bearing upon said diaphragm and a pivot pin carried by said stylus lever, and having a bearing in the sound box casing on one side of said lever, and a conical end resting upon a supporting bearing on the other side of said lever, substantially as specified.

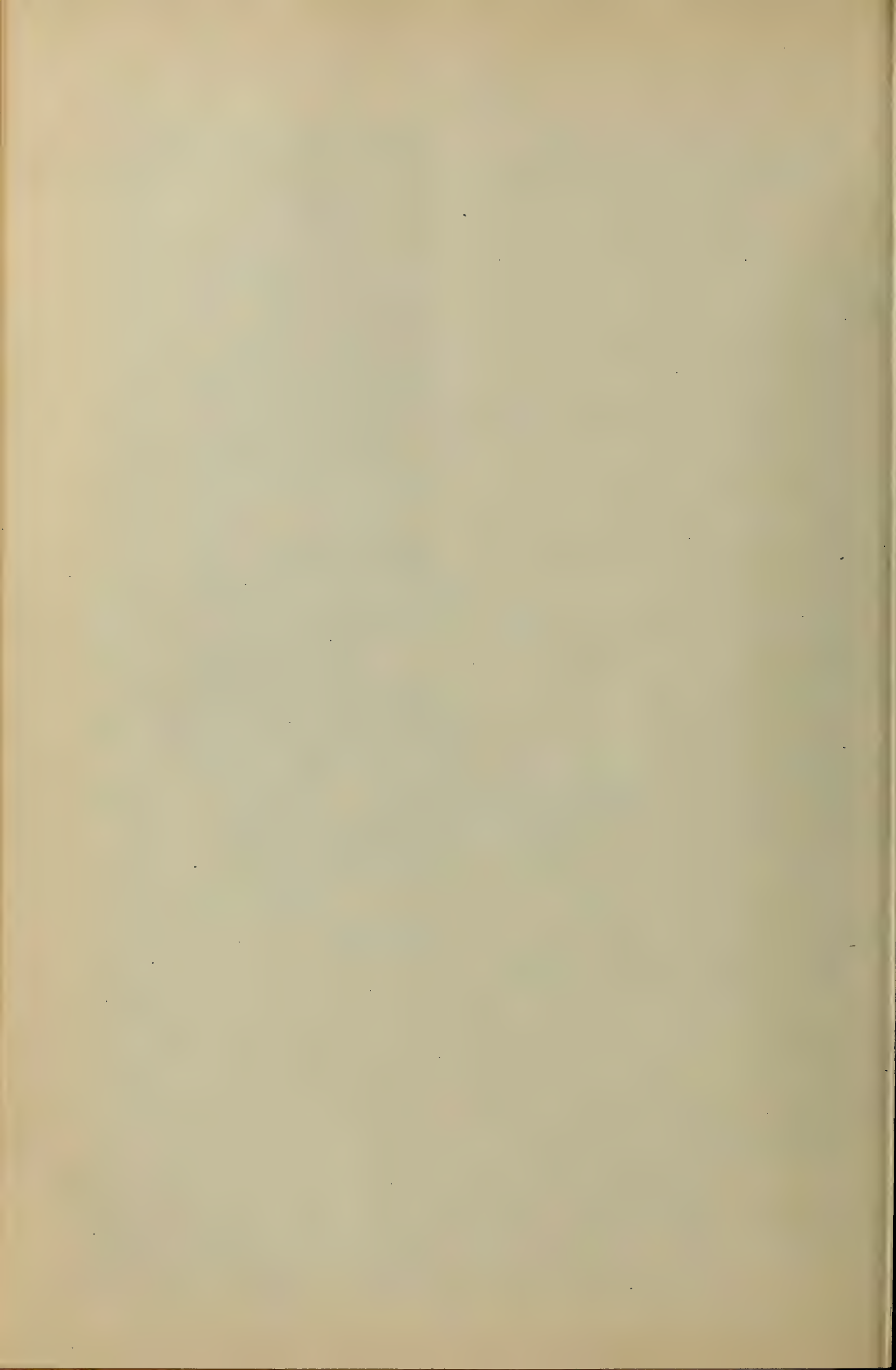
13. The combination of the sound box casing and its diaphragm with the stylus lever bearing upon said diaphragm and carrying a pivot pin which has on one side of the lever a bearing in which it can turn, and on the other side of the lever a conical end resting upon a supporting bearing, substantially as specified.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWIN H. MOBLEY.

Witnesses:

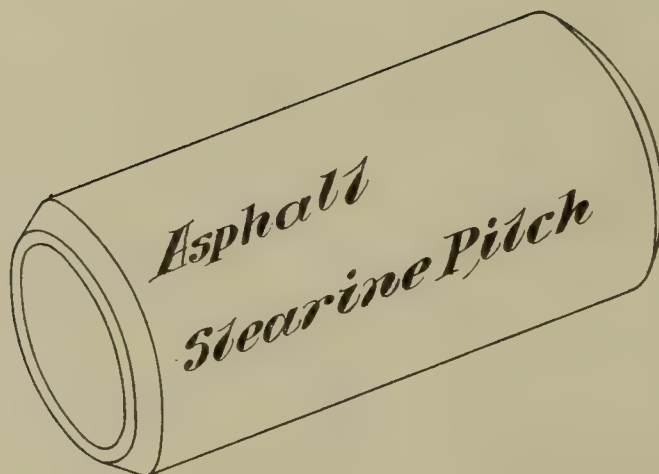
WALTER CHISM,
JOS. H. KLEIN.



No. 855,552.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.
COMPOSITION FOR PHONOGRAPHIC RECORDS.
APPLICATION FILED MAY 31, 1906.



Witnesses:

Frank O. Lewis

Delos Holden

Inventor:

Jonas W. Aylsworth

by Frank L. Ryan

Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

COMPOSITION FOR PHONOGRAPHIC RECORDS.

No. 855,552.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 31, 1906. Serial No. 319,421.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a new and useful Composition for Phonographic Records, of which the following is a description.

In an application for Letters Patent filed on even date herewith, I describe an improved duplicate phonograph record and process and apparatus for making the same, said record comprising a very smooth, hard, amorphous surface layer, and an inner layer welded thereto of much cheaper material, having the same coefficient of expansion so as to form a composite structure.

My present invention relates particularly to a suitable composition for the interior layer of composite phonographic records and my object is to provide a cheap tough and permanent material for this purpose.

To this end the invention consists of a composition of asphalt and stearin pitch, preferably in the proportion of about 80 parts by weight of asphalt and 20 parts by weight of the stearin pitch. Any hard asphalt, such as Syrian asphalt or gilsonite may be used, being preferably melted and strained, although the material may be used in the crude state. If desired, the asphalt may be made more fluid, so as to facilitate its casting within the surfacing layer by the addition of from five to fifteen percent of

stearic acid. Stearin pitch, as is well-known, is a black tarry residue, obtained in the manufacture of stearic acid, and resembling ozocerite. The stearin pitch may be melted and added to the melted asphalt or the two ingredients may be added together in solid form in the desired proportions, and then melted and stirred until intimately associated.

Reference is hereby made to the accompanying drawing which shows a conventional record tablet with the names of the ingredients of my improved composition applied thereto.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. A composition for phonographic records, consisting of asphalt and stearin pitch, substantially as set forth.

2. A composition for phonographic records, consisting of asphalt and a smaller proportion of stearin pitch, substantially as set forth.

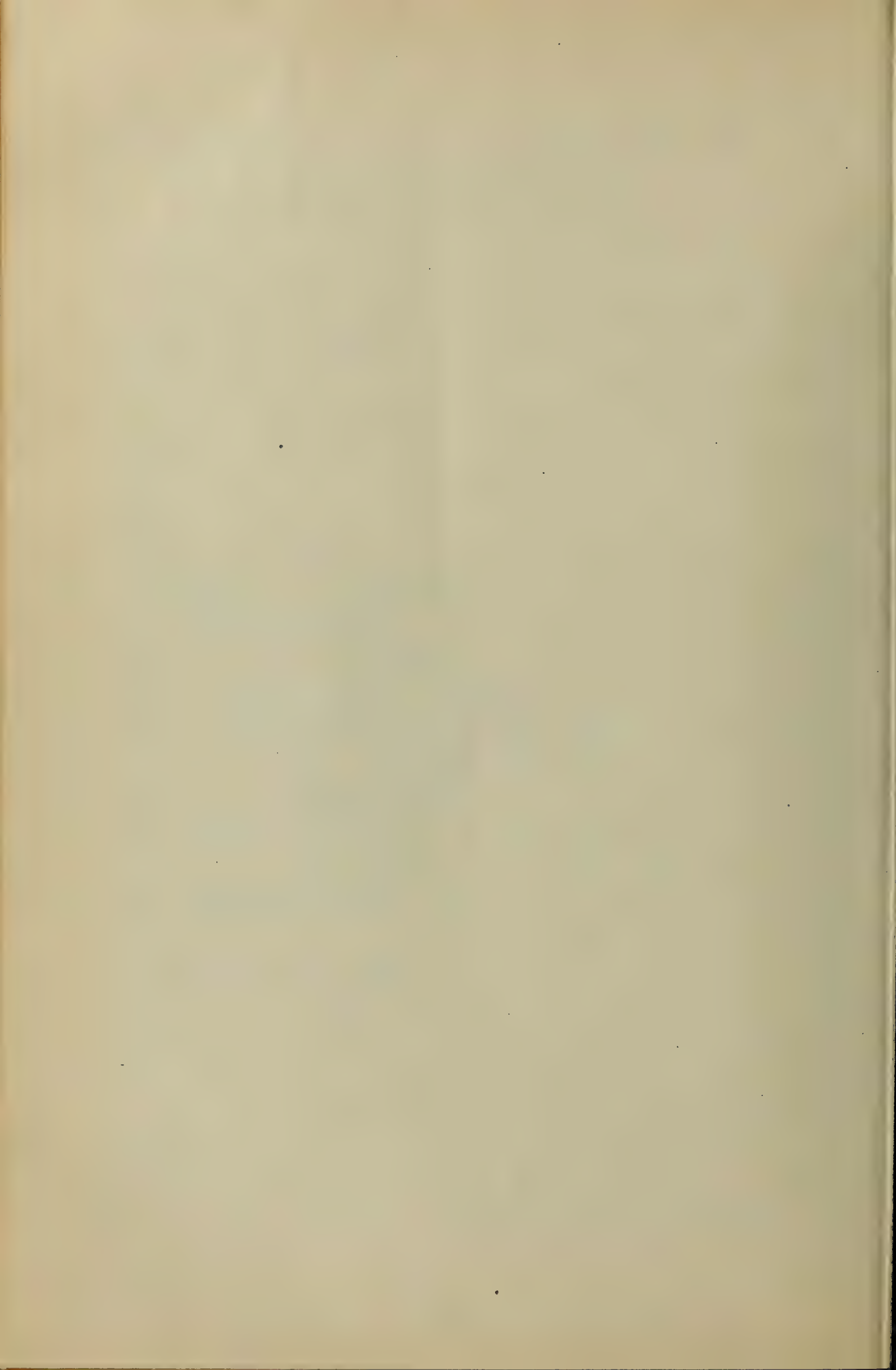
3. A composition for phonographic records, consisting of asphalt, stearic acid and stearin pitch, substantially as set forth.

This specification signed and witnessed this 26th day of May 1906.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.



No. 855,553.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.

PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED MAY 16, 1906. RENEWED APR. 4, 1907.

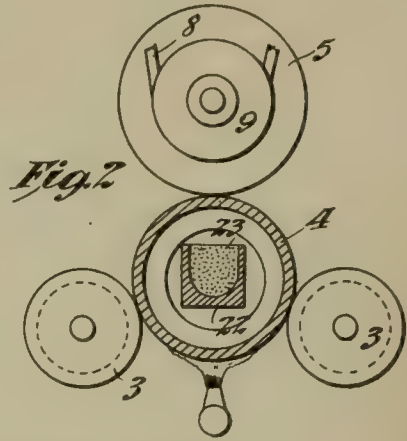
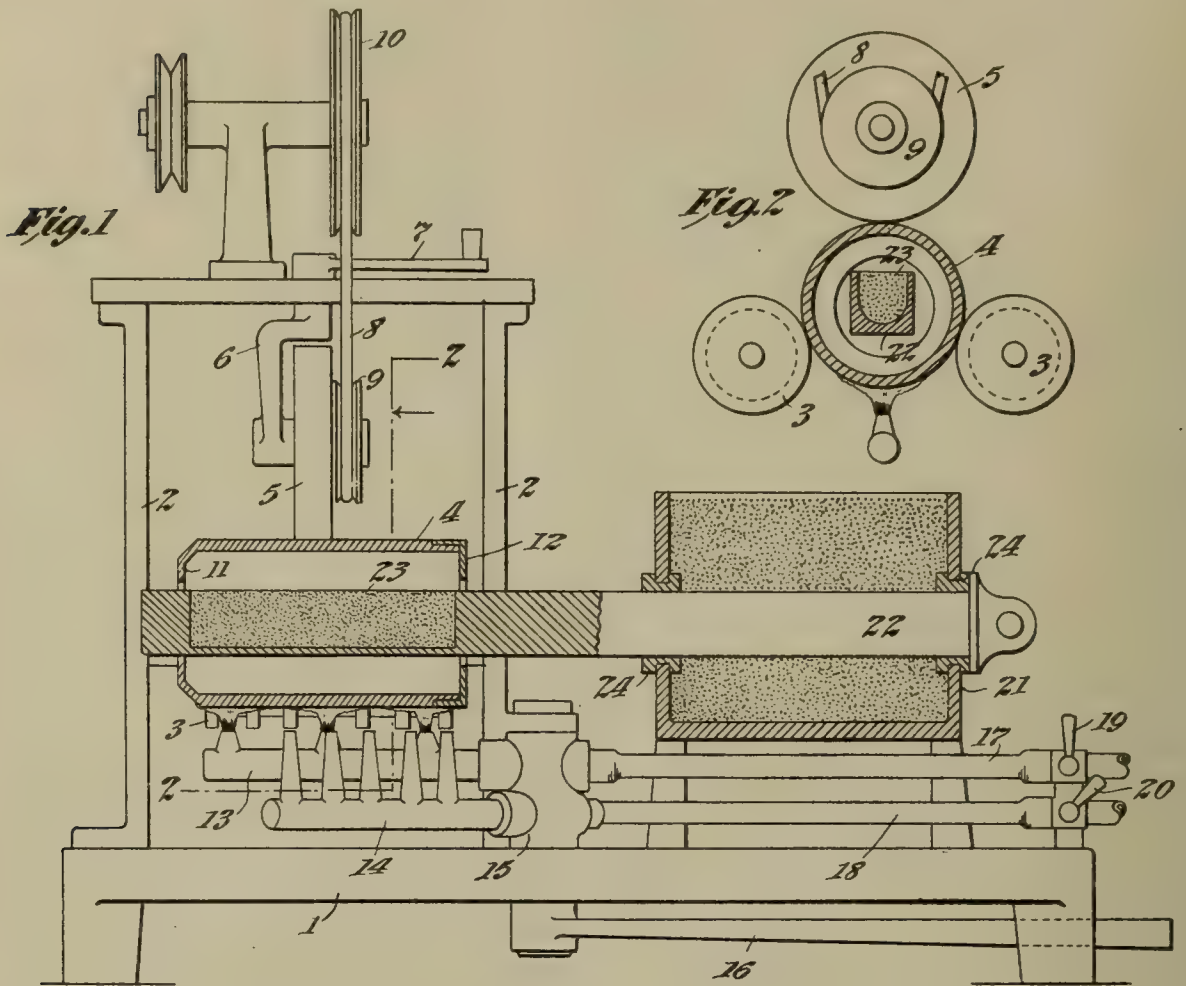


Fig. 3

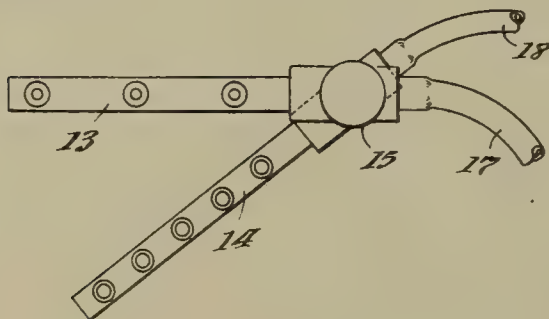
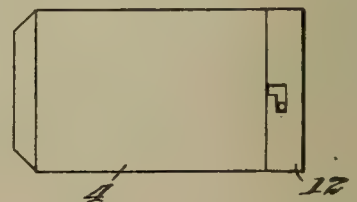


Fig. 4



Witnesses:

Frank D. Lewis
Anna D. Klein

Inventor:

Jonas W. Aylsworth
by Frank L. Loper
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING DUPLICATE PHONOGRAPH-RECORDS.

No. 855,553.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 16, 1906. Renewed April 4, 1907. Serial No. 366,428.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Process of Making Duplicate Phonograph-Records, of which the following is a description.

In an application for Letters Patent filed May 11th, 1906, Serial No. 316,250, I describe an improved process and apparatus for making duplicate phonograph records, in which a heated mold is rapidly rotated and a charge of molten material is supplied to the mold, so as to be distributed uniformly over the bore thereof while in a fluid condition, thereby driving any air or gas bubbles inwardly, after which the mold is rapidly cooled while being still rotated so as to cause the material to set and harden.

My present invention relates to an improved process of the general type disclosed in said application, but wherein the material of which the record is to be made is introduced within the mold in a solid condition, preferably in the form of a powder or small granules. Such a process is especially advantageous in connection with the molding of materials having a high melting point, or which are stringy or extremely viscid when molten so as to be difficult of manipulation in that condition, such as asphalt, shellac compositions, copal gum or compounds employing these ingredients. Even for the molding of records from ordinary wax-like compositions of the type disclosed in my Patent No. 782,375, dated February 14, 1905, it may in some instances be desirable to effect the molding from the solid state, as I shall hereafter describe, owing to the ease with which a definite quantity of such materials can be measured and the inconvenience of working with the material in a molten state.

In carrying the invention into effect, I rotate a hot mold at high speed and introduce a fusible material therein in the solid state, preferably in the form of powder or small granules, whereby the fusible material will be uniformly distributed over the bore of the mold by the centrifugal force developed and will be melted by the heat of the mold, so as to become fluid and take a very perfect im-

pression from the record surface, at the same time displacing any air or gas bubbles and forcing the same inwardly; after which the mold will be cooled, so as to chill or set the material while the mold is being continuously rotated.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1, is a longitudinal sectional view of the preferred apparatus for carrying the method into effect, Fig. 2, a sectional view on the line 2—2 of Fig. 1, Fig. 3, a plan view, showing the heating and cooling mechanism, and Fig. 4, an elevation of the complete mold.

In all of these views corresponding parts are represented by the same numerals of reference.

The base 1 is provided with frames 2—2, in which are mounted the idler rollers 3—3, for supporting the mold 4.

5 is a driving roller for rotating the mold, said roller being carried in a swiveled bracket 6, operated by a handle 7, so that by skewing the roller 5, the mold will be moved longitudinally from its engagement with the idler rollers 3—3, as I describe in said application. The driving roller 5 is rotated by a belt 8, engaging a pulley 9 and driven from a pulley 10.

The mold 4 is of any suitable type, carrying as heretofore the representation in relief of a record on its bore, and is provided with the usual flange 11, and with a removable flange 12, the latter being held in place by a bayonet joint, as shown in Fig. 4. I illustrate a gas burner 13, for heating the mold, and water nozzle 14 for cooling the same. The gas burner and water nozzles are connected to a pivoted body 15, operated by a handle 16, so that either the burner or nozzles may be brought in position below the mold to heat or cool the same. Flexible pipes 17—18 with valves 19—20 convey gas or water to the burner 13 or nozzles 14 respectively. It will be understood that other devices may be employed for heating and cooling the mold and that the mold may be heated to the necessary temperature outside of the apparatus when possessed of sufficient body to effect the melting of the solid material introduced therein.

Preferably the material from which the

records are made is contained in powdered form in a receptacle 21, adjacent to the mold, and in this receptacle is mounted a shaft 22, preferably square in cross-section, and having a trough 23 formed therein and arranged to reciprocate with respect to the receptacle. This shaft is mounted in independently rotatable bushings 24, which permit the shaft to be turned with respect to the receptacle when it is desired to empty the charge of material into the mold.

It will be obvious that by moving the shaft 22 to the right (Fig. 1) so as to withdraw the trough 23 within the receptacle 21, the trough will be filled with the powdered or granular material, so that when the shaft is returned to the position shown in Fig. 1 a fixed and definite charge of the material will be introduced within the mold. By now giving the shaft a half rotation, the charge of material will be deposited within the rapidly turning mold, so as to be uniformly distributed over the bore of the same. By reason of the heated condition of the mold, the material will be quickly brought to a fluid state, in which condition it intimately engages the entire record surface, forcing any air or gas bubbles radially inward and taking a very perfect impression. During this operation, the gas burner 13, if used, is maintained beneath the mold, so as to keep the latter in a heated condition. After the impression has been taken and while the mold is still being rapidly rotated, the handle 16 is operated so as to swing the water nozzles 14 beneath the mold, and the valve 20 is operated so as to cause jets of water to impinge against the mold and rapidly cool the same with its charge of material. When the material has been thus set and hardened, the handle 7 is moved to skew the driving roller 5, and force the mold longitudinally from its engagement with the idler rollers, whereupon the operations described are repeated.

A suitable material for use in the carrying of my present process into effect is that disclosed in my said Patent No. 782,375, dated February 14, 1905, which material will be crushed or ground to a powdered or granular condition, after having been formed. Any other fusible material may, however, be employed, such for example, as asphalt, shellac compositions, and compounds of similar nature.

It is possible by this method to make very perfect duplicate records of materials that are so stringy and viscid when in a molten condition that they cannot be effectively molded by existing processes, or whose melting point is so high as to make such processes undesirable.

Having now described my invention, what

I claim as new and desire to secure by Letters Patent is as follows:

1. The process of making duplicate phonograph records, which consists in rotating a heated tubular mold at high speed, and in introducing therein a charge of solid fusible material, whereby the material will be melted by the heat of the mold and distributed uniformly over the record surface thereof, substantially as set forth.

2. The process of making duplicate phonograph records, which consists in rotating a heated tubular mold at high speed, and in introducing therein a charge of solid fusible material, whereby the material will be melted by the heat of the mold and distributed over the record surface thereof, and in then rapidly cooling the mold and its contents to solidify and set the latter, substantially as set forth.

3. The process of making duplicate phonograph records, which consists in rotating a tubular mold at high speed, in heating the mold and in introducing therein a charge of fusible solid material, whereby the latter will be melted by the heat of the mold and distributed over the record surface thereof, substantially as set forth.

4. The process of making duplicate phonograph records, which consists in rotating a tubular mold at high speed, in heating the mold and in introducing therein a charge of fusible solid material, whereby the latter will be melted by the heat of the mold and distributed over the record surface thereof, and then in rapidly cooling the mold and its contents to solidify and set the latter, substantially as set forth.

5. The process of making duplicate phonograph records, which consists in rapidly rotating a heated tubular mold and in introducing therein a charge of powdered fusible material, whereby the latter will be melted by the heat of the mold and distributed over the record surface thereof, substantially as set forth.

6. The process of making duplicate phonograph records, which consists in rapidly rotating a heated tubular mold, in introducing therein a charge of powdered fusible material, whereby the latter will be melted by the heat of the mold and distributed over the record surface thereof, and in rapidly cooling the mold and contents to set and solidify the latter, substantially as set forth.

This specification signed and witnessed this 14th day of May 1906.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

J. W. AYLSWORTH.

PROCESS FOR MAKING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED MAY 16, 1906. RENEWED APR. 4, 1907.

Fig. 1

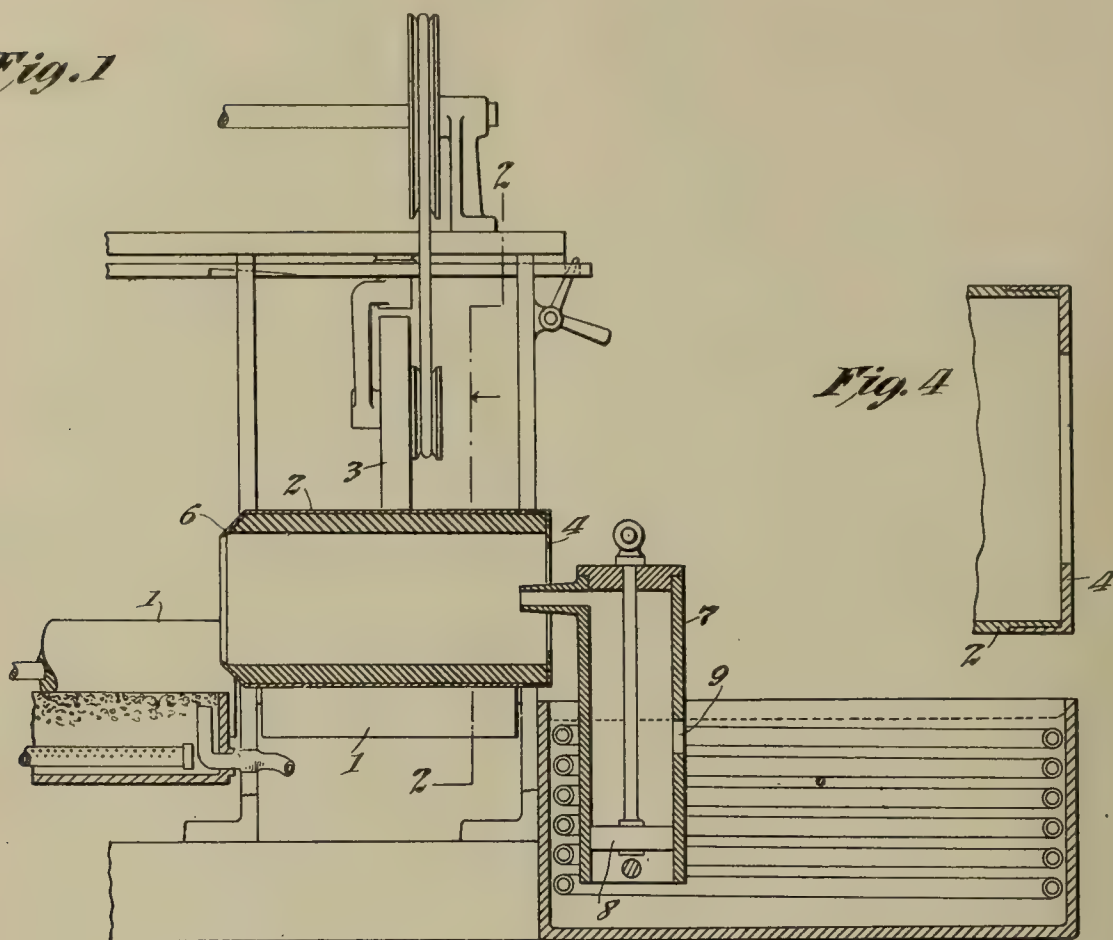


Fig. 4

Fig. 2

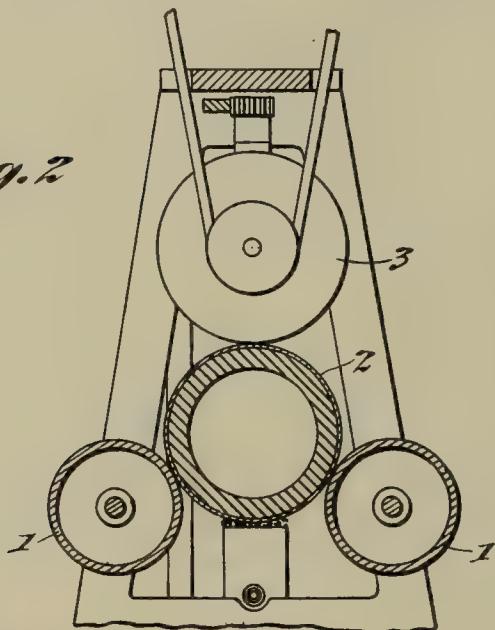
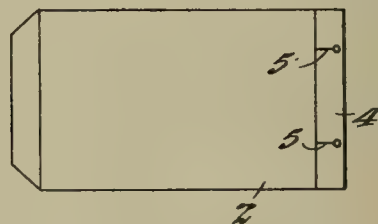


Fig. 3



Witnesses:

Frank D. Lewis

Anna P. Klehm

Inventor:

Jonas W. Aylsworth
by *Frank L. Dyer* *Atty.*

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS FOR MAKING DUPLICATE PHONOGRAPH-RECORDS.

No. 855,554.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 16, 1906. Renewed April 4, 1907. Serial No. 366,429.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Process for Making Duplicate Phonograph-Records, of which the following is a description.

In an application for Letters Patent, filed May 11th, 1906, Serial No. 316,250, I describe an improved process and apparatus for making duplicate phonograph records, wherein a heated mold is rotated at a high speed, and molten material is introduced therein, so as to be forcibly distributed uniformly over the bore of the mold by reason of the centrifugal force developed, any air or gas bubbles being forced radially inward so as to make a very perfect molded surface, and the mold being subsequently cooled while still being rotated, so as to set and harden the molten material. In the making of duplicate phonograph records by the process and apparatus described in said application, I contemplate using molds of the type now employed, which are about $\frac{1}{4}$ of an inch in thickness, and presenting a mass of metal somewhat greater than that contained in the desired duplicate records. Consequently, if it were attempted to make duplicate records from cold molds of this type, the molten material introduced within the mold will be quickly chilled on the record surface, resulting in the formation of air bubbles and preventing the uniform distribution of the material, as takes place when the mold is heated to permit the molten material to maintain its fluid condition while it is being distributed.

My present application relates to an improved process by which duplicate phonograph records can be produced in cold molds, and to this end the invention consists in making use of a mold having very thin walls, and in introducing therein the molten material at a high temperature, whereby the heat imparted to the mold will raise the temperature thereof to or above the melting point of the material, so that the latter will retain its fluid condition and will permit all air and gas bubbles to be driven radially inward as with the process described in my said application.

In order that the invention may be better

understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1, is a longitudinal sectional view through a part of an apparatus similar to that disclosed in said application, showing a single mold, and means for introducing charges of molten material therein, Fig. 2, a section on the line 2—2 of Fig. 1, Fig. 3, a side elevation of the mold, and Fig. 4, an enlarged detail view of the end of the mold.

In all of the above views, corresponding parts are represented by the same numerals of reference.

1—1 represent idlers to support the mold 2, the latter being rotated by a driving roller 3. The mold 2 is shown as being provided with very thin walls, say—about $\frac{1}{16}$ of an inch in thickness, so as to present a body of minimum heat absorbing capacity commensurate with the desired strength and rigidity. The movable end plate 4, is flanged and fits tightly over the open end of the mold, the elasticity of the flange being provided by slitting the same at 5—5, as shown. The permanent flange 6, is of the usual form and is provided with the desired engraved matter for identifying the record, as will be understood. Any suitable means may be employed for introducing charges of molten material into the mold, as for example, a pump 7, the plunger 8 of which is adapted to be moved below an opening 9, to which is supplied the molten material. This material may be of any suitable composition, as for example, either the special wax-like materials disclosed in my patents, No. 676,111 of June 11th, 1901, or No. 782,375 of February 14th, 1905. The temperature at which the molten material is heated in carrying the process into effect depends, obviously, upon the character of the material and upon the heat absorbing capacity of the mold, but with a mold having walls $\frac{1}{16}$ of an inch in thickness, the maintaining of the material at a temperature of 100° F. above its melting point when introduced into the mold will be amply sufficient for the purpose. The important consideration is that there shall be sufficient bulk of molten material heated to a sufficiently high temperature, as in comparison with the heat absorbing capacity of the mold, to raise the temperature of the mold

to or above the melting point of the material, before heat is absorbed from the material sufficiently to lower its temperature to the congealing point, so that the material will
5 retain its fluid condition while it is being distributed over the bore of the mold, and will permit air and gas bubbles to be forced radially inward, as I described in my said application. After the material has been thus
10 distributed uniformly around the interior of the mold, the latter may be forcibly and rapidly cooled in any suitable way, such as by the application of cooling pads for the same, as I describe in said application. When the
15 material has been thus solidified the finished duplicate record, after it has contracted away from the mold, may be removed therefrom, and its bore suitably finished, if necessary.

Having now described my invention, what
20 I claim as new and desire to secure by Letters Patent is as follows:

1. The process of making duplicate phono-

graph records, which consists in rapidly rotating a thin tubular mold, and in introducing therein a charge of very hot molten material, whereby the temperature of the mold
25 will be raised to or above the melting point of the material, substantially as set forth.

2. The process of making duplicate phonograph records, which consists in rapidly rotating a thin tubular mold, and in introducing therein a charge of very hot molten material, exceeding the mold in bulk, and presenting sufficient excess heating capacity to raise the temperature of the mold to or above
30 the melting point of the material, substantially as set forth. 35

This specification signed and witnessed this 14th day of May, 1906.

JONAS W. AYLSWORTH.

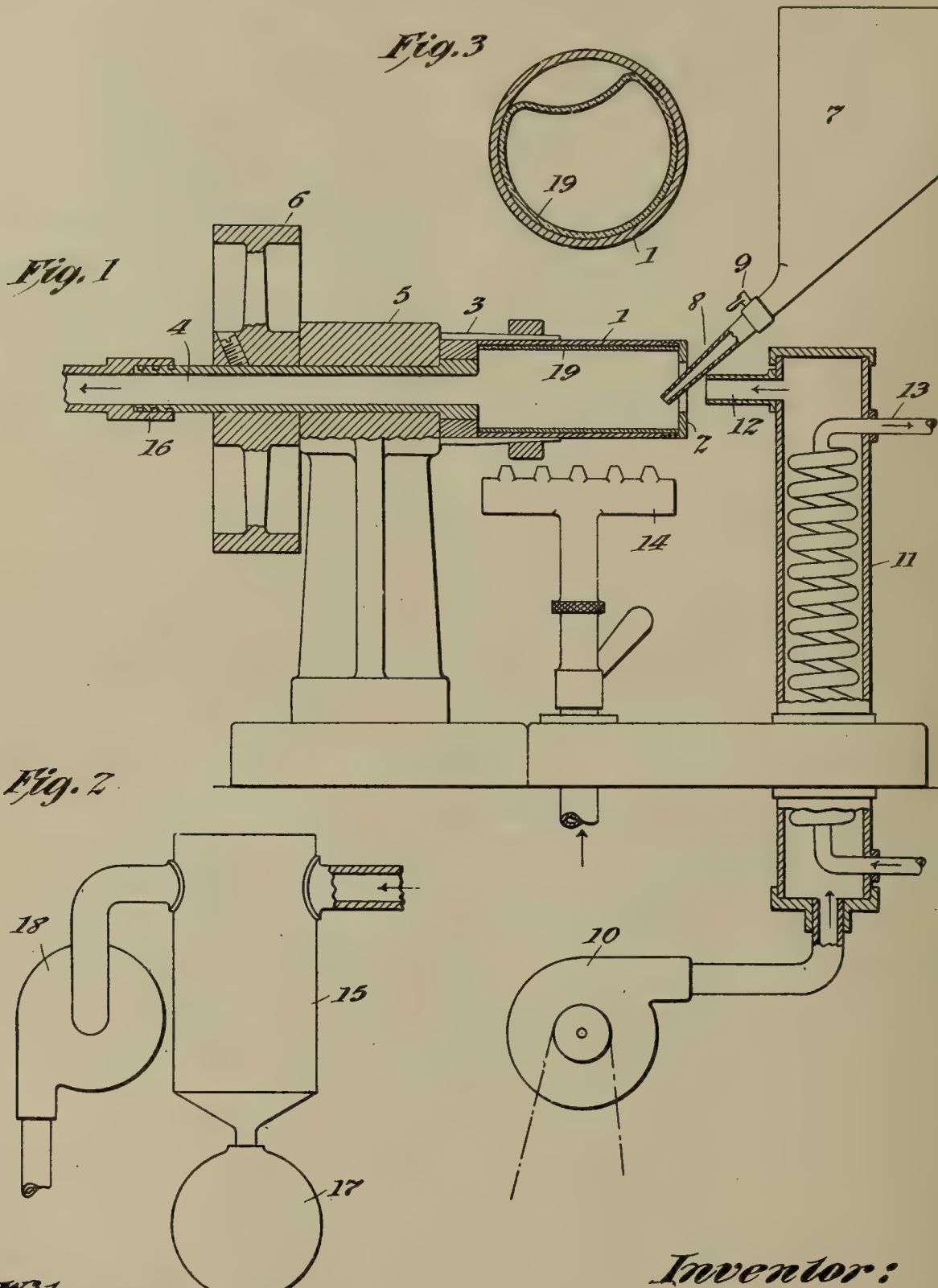
Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

J. W. AYLSWORTH.

PROCESS OF MAKING DUPLICATE SOUND RECORDS.

APPLICATION FILED MAY 31, 1906. RENEWED APR. 4, 1907.



Witnesses:
 Frank N. Lewis
 Anna P. Kellum

Inventor:
 Jonas W. Aylsworth
 by Frank L. Pyer
 Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING DUPLICATE SOUND-RECORDS.

No. 855,555.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 31, 1906. Renewed April 4, 1907. Serial No. 366,430.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Process for Making Duplicate Sound-Records, of which the following is a description.

My invention relates to an improved process for making duplicate sound records of celluloid, pyroxylin, collodion, cellulose, and other suitable materials not capable of being rendered molten so as to be cast, but dissolving readily in solvents, and in that condition being readily manipulated. I am, of course, aware that duplicate sound records have been made of celluloid and similar materials by the application of heat and pressure, but with such process it has been found impossible to obtain a smooth surface, so that the records are rough and scratchy. Furthermore, the material in being pressed into engagement with the record surface becomes merely distorted so as to conform with more or less exactitude with the irregularities thereof, and there is therefore always a tendency for the material to revert to its original condition, thereby resulting in a gradual weakening of the record surface. It has also been proposed to make records of pyroxylin or similar materials by dipping a mold or matrix in a solution of the material to form a film from which the solvent is allowed to evaporate, but such a film is manifestly excessively thin, and hence difficult to handle and to properly support. Obviously, if it were attempted to build up a record of greater thickness by repeating the dipping operations, the outer films would be likely to peel off, while during manufacture the film or films already deposited within the matrix would be dissolved more or less by the solvent so that the operation would be necessarily slow and expensive.

My invention relates to an improved method by which records can be made of the materials under consideration in a very cheap and effective manner by an operation strictly analogous to a true casting process, so that there will be no tendency of the record surface to become changed in use, while at the same time the record surface will be smooth and brilliant, and furthermore, the record

will be perfectly homogeneous throughout and of any desired thickness.

The process consists in rotating a matrix or mold at a high speed, and in introducing within the same a solution of the desired solid material, such as celluloid or pyroxylin, or compounds employing the same, whereby the centrifugal force developed will cause the solution to distribute itself uniformly over the bore of the matrix, thereby driving any air bubbles inward and causing the solution to intimately engage the record surface, so as to fill all the irregularities of its contour. After the solution has been thus distributed over the bore of the matrix so as to take an accurate impression from the record surface thereof, the solvent is either permitted to evaporate or is forcibly evaporated so as to deposit the solid material as a homogeneous cylindrical body with an absolutely accurate impression of the record surface molded on its exterior. Preferably, the evaporation of the solvent is facilitated by a blast of hot air, from which the solvent can be evaporated by condensation so as to permit the process to be carried on economically. After the record has been formed within the matrix, it is separated therefrom, preferably by immersing the matrix with its contents in hot water so as to permit the duplicate to be readily stripped out by collapsing it inward or by subjecting the matrix to sufficient cold to cause the duplicate to shrink diametrically, so as to clear the matrix, as I will more fully hereinafter describe and claim.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which—

Figure 1, is a diagrammatic view of a portion of a suitable apparatus for carrying the process into effect, Fig. 2, a similar view, showing the condenser and suction fan, and Fig. 3, a cross sectional view through the matrix, illustrating one way of removing the finished record.

In all of the above views, corresponding parts are represented by the same numerals of reference.

The matrix 1 is formed in any suitable way from a master record, but preferably, by a process of vacuous deposit, as is well known in the art. This matrix is provided

with an end flange 2, which may be integral or removable, as desired, and which may carry suitably engraved matter for identifying the record, as heretofore. Suitable provision is made for rotating the matrix at the necessary speed, as for instance, a chuck 3 carried by a hollow shaft 4, the latter being mounted in a suitable bore 5, and rotated by a pulley 6. The chuck 3 as is shown, forms a closure for the matrix at its inner end.

In order to introduce the solution within the matrix, I show a tank 7 from which leads a nozzle 8 into the matrix and provided with a valve 9 for controlling the flow of liquid. Preferably provision is made for rapidly evaporating the solvent, after the solution has been uniformly distributed over the bore of the mold and time has been allowed for the dispersion of all air bubbles. For this purpose I illustrate a fan or blower 10, connected with a chamber 11, having an outlet 12, leading to the matrix and heated in any suitable way, as for example, by a steam coil 13, whereby the air before reaching the matrix will be heated so as to drive off the solvent more rapidly. For the same purpose, nozzles provided with a series of vents may be arranged adjacent to the rotating matrix and connected with a suitable supply of warm or hot air, so as to heat the matrix and facilitate the driving off of the solvent. When it is desired to recover the solvent during the process, I employ a condenser 15 connected with the hollow shaft 4 by a suitably packed joint 16 and provided with a receiving tank 17, beneath the condenser in which the solvent separated by the same will be recovered, as is common in the art of distillation. If desired, a suction fan 18 may be connected to the condenser so as to facilitate the circulation of hot air and the volatile solvent carried therewith, but this suction fan may be dispensed with, if a sufficient blast is provided by the blower 10.

In carrying my process into effect, I first charge the tank 7 with a solution of the desired material, as for example a solution of pyroxylin in acetone, although any other suitable material may be employed with the proper solvent for the same, or the solid material may be more or less adulterated with various cheaper substances, such as castor oil or camphor, or a number of solid materials may be employed together so long as a solution of the same can be secured. The solution need not be very limpid, but at the same time care should be taken not to have it too viscid, so as to flow with difficulty and fail to take a clear and sharp impression of the record surface. A solution having about the consistency of molasses will be amply limpid for the purpose. The tank 7 being thus charged with a suitable solution, the matrix is rotated at the desired speed and the valve 9 is opened, permitting

a sufficient charge of the solution to enter the matrix. Owing to its liquid form, the solution will be distributed by the centrifugal force uniformly over the entire bore of the mold, so as to intimately engage and take a sharp impression of the record surface. At the same time, any air bubbles which may become entrapped by the solution will be driven radially inward, so that the record surface will be free from any roughness, and will be an absolutely accurate copy of the matrix. When the solution is introduced within the matrix, the latter is preferably maintained at or below the room temperature, so as to permit the solution to become uniformly distributed, as explained, without an appreciable evaporation of the solvent taking place. After the material has been thus distributed over the bore of the matrix, which of course, will require only a few seconds, a warm blast from the fan or blower 10 is driven through the matrix and the latter is also preferably heated by the blast 14. This results in the rapid evaporation of the solvent, which will be carried off with the hot air and separated from the latter in the condenser 15. The separated solvent collected in the tank 17, may be used again in the make-up of fresh solutions. When the solvent has been entirely evaporated, the record 19 will exist as a tubular structure, intimately engaging the matrix and following with absolute accuracy all the contours and variations of the record surface. The thickness of the walls of the record will obviously depend upon the amount of the solution introduced within the matrix.

When the record is provided with thin enough walls to be collapsed, the matrix may be first dipped in hot water so as to slightly soften the record and permit it to be collapsed inwardly, as shown in Fig. 3, so as to be thereby separated from the matrix. If, however, it is formed with relatively thick walls, so as not to be capable of being collapsed readily, the matrix may be subjected to cold, or be allowed to chill so as to cause the record to shrink radially away from the matrix and permit of its removal. Records made in this way can be provided with separate end flanges to permit them to be mounted on the tapered mandrel of the phonograph or they may be mounted on false shells, which in turn are carried on the mandrel, both of which expedients are well known in the art. If, however, the phonograph is provided with an expansible mandrel, the record may be used directly thereon, since it will be formed with a cylindrical bore, as an inherent result of the process.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. The process of making duplicate phonograph records, which consists in rapidly ro-

tating a matrix, in introducing therein a solution of a solid material, whereby the solution will distribute itself uniformly over the bore of the matrix and in then driving a blast of air through the matrix as it continues to rotate in order to evaporate the solvent from the solid material, substantially as set forth.

2. The process of making duplicate phonograph records, which consists in rapidly rotating a matrix, in introducing therein a solution of a solid material, whereby the solution will distribute itself uniformly over the bore of the matrix and in then driving a blast of warm air through the matrix as it continues to rotate in order to evaporate the solvent from the solid material, substantially as set forth.

3. The process of making duplicate phonograph records, which consists in rapidly rotating a matrix, in introducing therein a solution of a solid material, whereby the solution will distribute itself uniformly over the bore of the matrix, in then driving a blast of air through the matrix as it continues to rotate in order to evaporate the solvent from the solid material, and in finally condensing the evaporated solvent, substantially as set forth.

4. The process of making duplicate phonograph records, which consists in rapidly rotating a matrix, in introducing therein a solution of a solid material, whereby the solution will distribute itself uniformly over the bore of the matrix, in then driving a blast of warm air through the matrix as it continues to rotate in order to evaporate the solvent from the solid material, and in finally condensing the evaporated solvent, substantially as set forth.

5. The process of making duplicate phonograph records, which consists in rapidly rotating the matrix, in introducing therein a solution of the solid material, whereby the latter will be distributed over the bore of the matrix by the centrifugal force developed, and finally in applying heat to the matrix so as to facilitate the evaporation of the solvent, substantially as set forth.

6. The process of making duplicate phonograph records, which consists in rotating the matrix at a high speed, in introducing therein a solution of a solid material, whereby the latter will be distributed over the bore of the matrix by the centrifugal force developed, in then heating the matrix and simultaneously blowing a blast of air through the same so as to evaporate and carry off the solvent, substantially as set forth.

7. The process of making duplicate phonograph records, which consists in rotating the matrix at a high speed, in introducing therein a solution of a solid material, whereby the latter will be distributed over the bore of the matrix by the centrifugal force developed, in then heating the matrix and simultaneously blowing a blast of warm air through the same so as to evaporate and carry off the solvent, substantially as set forth.

8. The process of making duplicate phonograph records, which consists in rotating the matrix at a high speed, in introducing therein a solution of a solid material, whereby the latter will be distributed over the bore of the matrix by the centrifugal force developed, in then heating the matrix, in simultaneously blowing a blast of air through the same so as to evaporate and carry off the solvent and in condensing and separating the evaporated solvent, substantially as set forth.

9. The process of making duplicate phonograph records, which consists in rotating the matrix at a high speed, in introducing therein a solution of a solid material, whereby the latter will be distributed over the bore of the matrix by the centrifugal force developed, in then heating the matrix, in simultaneously blowing a blast of warm air through the same so as to evaporate and carry off the solvent, and in condensing and separating the evaporated solvent, substantially as set forth.

This specification signed and witnessed this 29th day of May 1906.

JONAS W. AYLSWORTH.

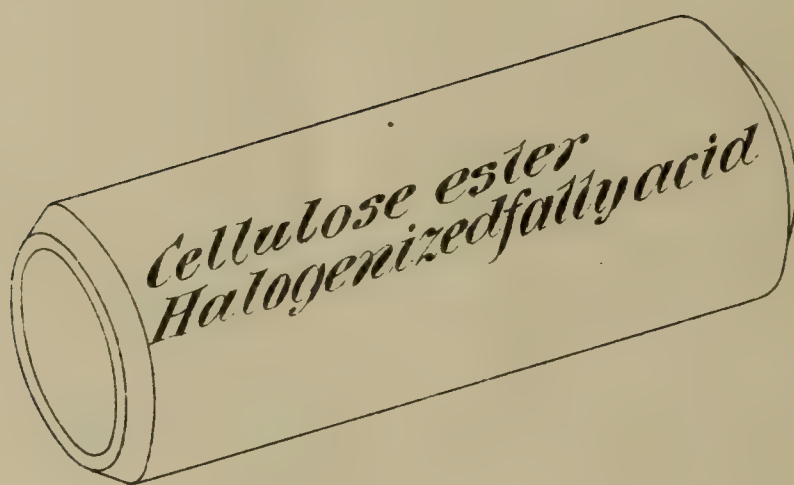
Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

No. 855,556.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.
DUPLICATE SOUND RECORD.
APPLICATION FILED MAY 31, 1908.



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Jonas W. Aylsworth
by Frank L. Brown
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY,
A CORPORATION OF NEW JERSEY.

DUPLICATE SOUND-RECORD.

No. 855,556.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 31, 1906. Serial No. 319,466.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Duplicate Sound-Records, of which the following is a description.

My invention relates to an improved duplicate sound record made of a tough, permanent material capable of receiving and retaining an absolutely accurate copy of a matrix, having no ingredient which will evaporate to effect the record surface (as is the case with camphor in celluloid), which will be practically non-inflammable and which will be sufficiently flexible to permit of its being collapsed when it is desired to remove the same from the matrix.

Duplicate sound records have heretofore been made of celluloid, but owing to the slow evaporation of the camphor, these records become minutely pitted in time, so as to present a rough and scratchy surface.

In an application filed on even date herewith, I describe an improved composition of a celluloid-like nature, said composition being based on the discovery that a halogenized fatty acid or derivative thereof, such as chlorinated stearic acid, acts as a solid solvent for pyroxylin or other cellulose esters, such as the esters of the acetic series, the compound being manufactured by the employment of a common solvent, such as acetone, which upon evaporation results in a celluloid-like composition having desirable properties of toughness, flexibility and non-inflammability, and being practically permanent, since the solid solvent does not evaporate, as is the case with camphor in celluloid.

My present invention relates to the production of a duplicate sound record of this improved material. The advantages of such a sound record are great toughness and smoothness of the record surface, absolute permanency thereof and substantial non-inflammability.

Reference is hereby made to the accompanying drawing which shows a conventional record tablet with the names of the ingredients of my improved composition applied thereto.

In producing the compound I first obtain a halogenized fatty acid or fatty acid derivative, as I describe in said application. For example, ordinary commercial stearic acid may be chlorinated for several days in the presence of a catalytic agent, such as iodine or antimony chlorid, until a more or less viscid, oily, or resinated solid body is secured, dependent upon the extent to which the chlorinating process is carried. The solvent thus secured is added in varying proportions to the desired cellulose body, such as pyroxylin and may actually exceed the quantity of the latter. The two bodies thus added together are now dissolved in a common solvent, such as acetone, to form a more or less viscid fluid solution, one having the limpidity of molasses being suitable for the purpose. Duplicate sound records are made of this material in any suitable way, either by forming tubes of the same and expanding such tubes under heat and pressure against the walls of the matrix, as is done with the manufacture of ordinary celluloid records at the present time, or by the special process described in my application for Letters Patent filed concurrently herewith. In the latter process the matrix is rapidly rotated and the solution introduced therein so as to be uniformly distributed against the matrix walls by the centrifugal force developed and thereby take an absolutely accurate impression of the record surface. In this distribution of the solution any air bubbles will be forced radially inward. After the solution has been thus distributed over the record surface of the rotating matrix which will require only a few seconds, the solvent is evaporated by blowing a blast of warm air through the matrix and preferably also by heating the matrix exteriorly so as to facilitate the evaporation. When the solvent has been entirely evaporated the record will exist on the interior of the walls as a continuous homogeneous cylindrical structure carrying an absolutely accurate representation of the record surface and may be removed from the matrix either by immersing the latter in hot water and collapsing the record inwardly or by chilling the matrix so as to cause the record to shrink radially and permit of its withdrawal.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows: —

- 5 1. A duplicate sound record composed of a composition of a cellulose ester and a halogenized fatty acid or derivative thereof, substantially as set forth.
2. A duplicate sound record composed of a composition of a cellulose ester and a chlorinated fatty acid or derivative thereof, substantially as set forth.
- 10 3. A duplicate sound record composed of a composition of a cellulose ester and halogenized stearic acid, substantially as set forth.
- 15 4. A duplicate sound record composed of a composition of a cellulose ester and chlorinated stearic acid, substantially as set forth.
5. A duplicate sound record composed of

a composition of a cellulose ester of the acetic series and a halogenized fatty acid or derivative thereof, substantially as set forth. 20

6. A duplicate sound record composed of a composition of a cellulose ester of the acetic series, and halogenized stearic acid, substantially as set forth. 25

7. A duplicate sound record composed of a composition of a cellulose ester of the acetic series, and chlorinated stearic acid, substantially as set forth.

This specification signed and witnessed 30 this 29th day of May 1906.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

No. 855,557.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.
PROCESS FOR MAKING PHONOGRAPH BLANKS.
APPLICATION FILED JAN. 19, 1907.

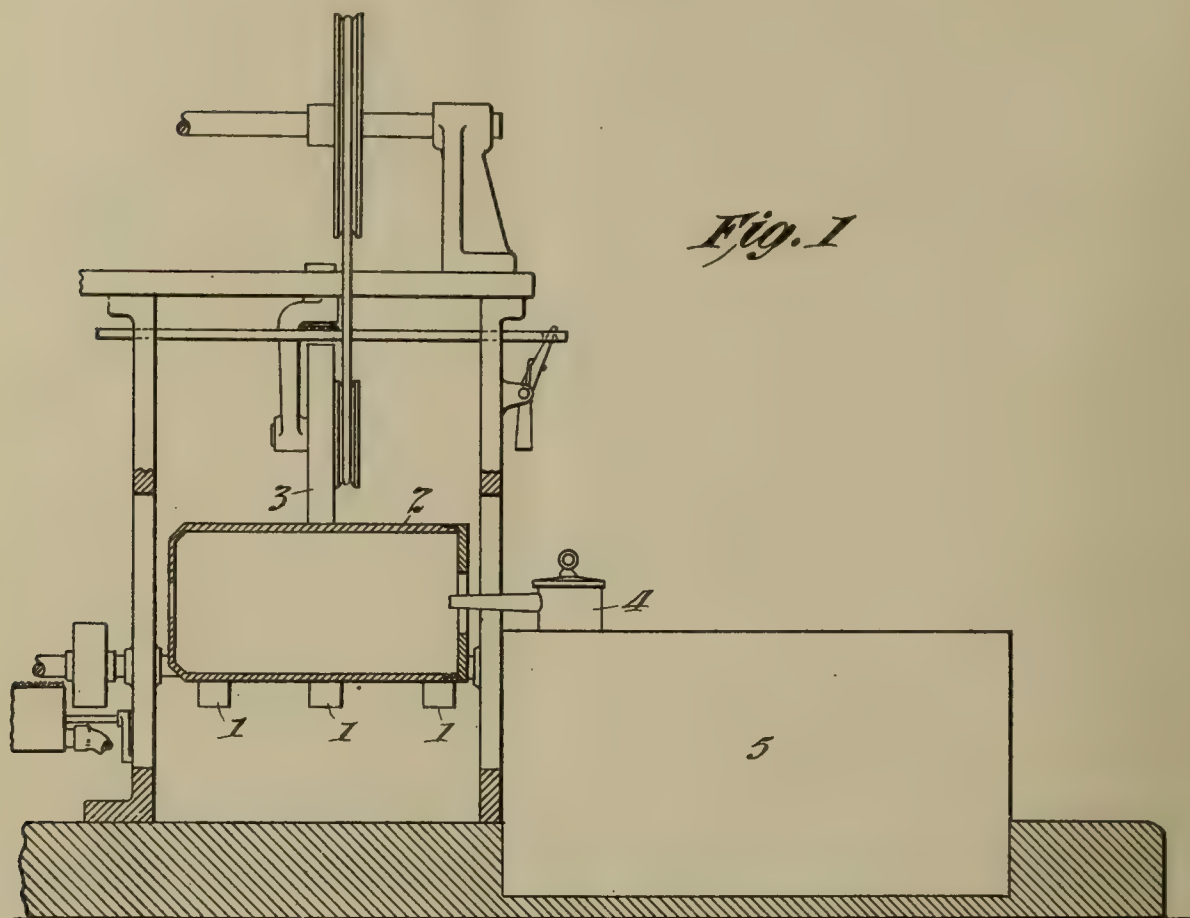
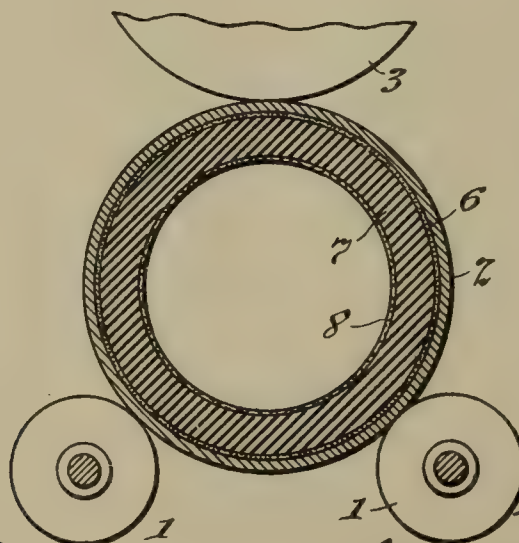


Fig. 1

Fig. 2



Witnesses:

Frank D. Lewis
Alfred H. Ladd

Inventor:

Jonas W. Aylsworth
by Frank L. Dyer

Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS FOR MAKING PHONOGRAPH-BLANKS.

No. 855,557.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed January 19, 1907. Serial No. 353,007.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Process for Making Phonograph-Blanks, of which the following is a description.

My invention relates to an improved process for manufacturing blank record tablets for use on phonographs and allied talking machines in which cylindrical blanks are employed, and my object is to provide a process by which the blanks may be manufactured economically and wherein the recording surface will be of a uniformly perfect character.

As phonograph blanks are now commercially made, they are formed of a homogeneous metallic soap composition consisting generally of stearate of soda, stearate of alumina, free stearic acid and a hydrocarbon ingredient such as paraffin or ceresin. The aim of the manufacturer is to produce the composition in as pure a form as possible, and to this end the operations are carried on with great care and the composition after being finished is generally subjected to one or more filtrations. Notwithstanding these precautions, however, the composition frequently contains minute gas bubbles as well as mechanical impurities, such as dust particles, small pieces of lint and crystals of saline impurities. These impurities when they appear on the surface of the blanks result in an imperfect record which cannot be effectively used as a master from which to make a mold for duplicating purposes. The encountering of these small imperfections in the blanks is annoying and expensive under conditions of commercial manufacture since in making the master a very expensive artist may be employed or an entire band or orchestra; yet the presence of a single piece of lint in the record surface or other imperfection therein, will result in the formation of a so called "blind," necessitating the discarding of the record and a new trial.

In applications for Letters Patent filed May 11, 1906, Serial No. 316,250; May 16, 1906, Serial No. 317,083; May 16, 1906, Serial No. 317,082, and May 31, 1906, Serial No. 319,422, I have described certain processes for manufacturing duplicate sound

records from matrices or molds consisting generally in rotating the mold at a high speed and introducing therein a charge of molten or comminuted wax-like material, the mold being either hot enough prior to the introduction of the material or being heated during its rotation so that the material will maintain its molten state, if introduced as such, or be rendered molten if introduced in comminuted condition. By reason of the rotation of the mold at a high speed the molten material will be distributed uniformly over its bore so as to take a clean and sharp impression, after which the rotation of the mold is continued until the material has become set, and is finally removed by permitting it to contract diametrically to a sufficient extent to clear the engaging surface. This general process is of especial utility in connection with the manufacture of phonograph blanks, because I have discovered that when the material in molten condition is maintained in contact with the bore of a rotating mold, the centrifugal effect is sufficient to separate from the molten material any foreign matter accidentally lodged therein. Such of the matter as may be of greater specific gravity than the composition, for instance, grit and dirt, will be forced outward to the outer surface, on the other hand, the material which is lighter than the composition, such as lint or gas bubbles, will be displaced by the composition and driven inward. After the mold has been rotated for about one minute at a speed of two thousand revolutions per minute, the wax composition being maintained in a molten state, an effective separation of the impurities will have taken place. The mold while still rotating is either allowed to cool or is forcibly chilled so as to cause the material to set and harden, whereupon the rotation may be arrested. A further reduction of temperature effects a longitudinal contraction of the blank, permitting its removal from the mold. The blank is now reamed on its interior so as to fit the tapered mandrel of a suitable recording machine and is then shaved off on its exterior so as to present the desired diameter. The amount of material shaved off from the exterior of the blank should be of sufficient depth to include the heavier impurities which are driven out to the surface. For this reason the molds in

which the blanks are made should be slightly larger than those now used, since the amount of material shaved off will, to assure absolute certainty, be somewhat greater than is now removed under existing methods.

In order that the invention may be better understood, attention is directed to the accompanying drawings forming part of this specification, and in which—

10 Figure 1 is a longitudinal sectional view through a part of the apparatus similar to that disclosed in the above mentioned applications, showing a single mold, and means for introducing material therein; and Fig. 2 is a
15 sectional view of a mold showing the material within the same.

1—1 represent idlers to support a mold 2, the latter being rotated by a driving roller 3. The mold 2 is shown as being provided with
20 end caps 2', one of which is removable so as to maintain the molten material within the mold during its rotation. Any suitable means may be employed for introducing molten material within the mold, as for ex-
25 ample, a plunger pump 4, mounted in a tank 5, containing the molten material. Referring to Fig. 2, I show the mold 2 as it appears when rotated at a high speed, the heavier particles 6 being driven by centrifugal force,
30 because of their greater specific gravity, to the exterior of the molten material 7, and the lighter particles and bubbles 8 being displaced and forced inward by the molten material. After the blank is set and removed,
35 the outer surface is shaved off below the layer 6 containing the heavier impurities, while preferably the inner surface is reamed out sufficiently to include all of the lighter im-
40 purities, although this is not so important. The resulting blank will be obviously entirely free of impurities or imperfections on its recording surface.

The composition which I prefer to employ

is that which is commonly used at the present time for making blank tablets and consists of
45 the metallic soap mixture above generally described.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:
50

1. The process of making cylindrical blank record tablets for talking machines which consists in rotating a hot mold at a high speed containing a charge of molten material within the same, whereby the material therein
55 will be distributed uniformly on its bore and a separation of the impurities from the material will be effected, in then allowing the mold to cool so as to set the material, in then removing the blank from the mold, and in
60 finally shaving off the outer surface of the blank so as to thereby remove any impurities which may be lodged therein, substantially as and for the purposes set forth.

2. The process of making cylindrical blank
65 record tablets for talking machines which consists in rotating a hot mold at a high speed containing a charge of molten material within the same, whereby the material therein will be distributed in molten condi-
70 tion on its bore and a separation of the impurities from the material will be effected, in then allowing the mold to cool so as to set the material, in then removing the blank from the mold, in shaving off the outer surface of
75 the blank so as to thereby remove any impurities which may be lodged therein, and in finishing the interior of the blank, substantially as and for the purposes set forth.

This specification signed and witnessed
80 this 18th day of January 1907.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.

T. A. EDISON.
DIAPHRAGM FOR TALKING MACHINES.
APPLICATION FILED MAR. 8, 1907.

Fig. 1

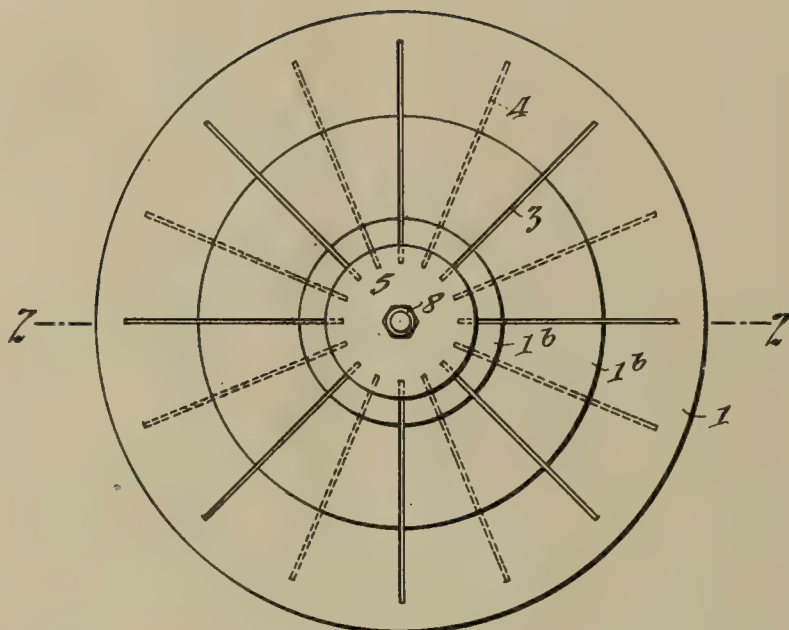
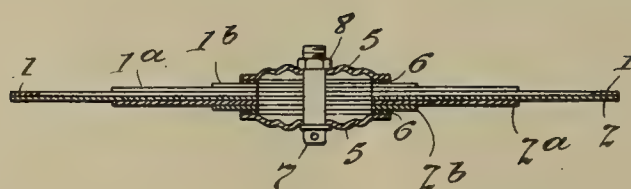


Fig. 2



Witnesses:

Frank D. Lewis

Anna R. Nelson

Inventor:

Thomas A. Edison

by Frank L. Dyer
Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY,
ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE,
NEW JERSEY, A CORPORATION OF NEW JERSEY.

DIAPHRAGM FOR TALKING-MACHINES.

No. 855,562.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed March 6, 1907. Serial No. 360,936

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Diaphragms for Talking-Machines, of which the following is a description.

My invention relates to improvements in diaphragms for talking machines both for recording and reproducing, and my object is to provide an improved diaphragm that will be readily responsive to vibrations of comparatively great amplitude.

With diaphragms as now made in the form of a continuous disk (or a series of disks of decreasing diameters) clamped rigidly at its edge, the extent of the amplitude to which the diaphragm is capable of vibrating is necessarily very limited, since the material of which it is formed is not only flexed as the diaphragm vibrates on either side of the medial line, but undergoes stretching and contraction as it moves away from or toward the medial line. This limited capacity of the diaphragm to partake of any considerable degree of amplitude, limits in a measure the loudness of the reproduction. If it were attempted to remedy this defect by increasing the diameter of the diaphragm or materially reducing its thickness, the reproduction would not be increased but would become more or less flabby or hollow.

Another difficulty encountered with diaphragms as now constructed is that the resistance to the vibrating effect is not uniform as the diaphragm moves to either side of the medial line, but enormously increases with the amplitude, so that even if such diaphragms were capable of vibrating to a considerable extent, the power available to operate them would be insufficient to effect that result without incurring undue wear on the record surface. To effect a materially increased amplitude, I propose the making of a diaphragm in which these two difficulties are very largely removed, since the diaphragm will be capable of being vibrated to a much greater amplitude than is now possible, while the resistance to the vibration does not materially or objectionably increase

within reasonable limits on either side of the medial line.

To this end the invention comprises a duplex diaphragm made of at least two disks, each of which is radially slotted so that each disk will constitute a series of reeds, and the slots of the disks being staggered so that a continuous surface will be presented for actuating the sound waves. Said disks are preferably cemented together by means of an elastic cement, such as a solution of gum rubber, in order to prevent undue resistance in vibrating. If two disks as above described were alone used, each of the reeds would be flexed throughout substantially its entire length, whereas the best results are obtained if the flexure is substantially limited to the base of each reed, so that each reed will substantially vibrate as a whole. To secure this effect I preferably form each section of the duplex diaphragm of a series of disks, say three in number, of gradually reduced diameter, whereby the vibration will be practically limited to the thinnest or outer portion. Having constructed a diaphragm of two disks or series of disks as explained, the central opening formed therein is closed by a pair of light corrugated disks seated on rubber gaskets and with which connection is made to the recording or reproducing stylus.

In order that the invention may be better understood attention is directed to the accompanying drawing forming part of this specification, and in which—

Figure 1 is a plan view of the improved diaphragm, and Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

In both of these views the same parts are represented by corresponding reference numerals.

As shown, the diaphragm in its preferred form is composed of two disks, 1 and 2, and supplemental disks 1^a, 1^b and 2^a and 2^b. The disks forming the section 1, 1^a, 1^b and the section 2, 2^a and 2^b are first cemented together as in the manufacture of ordinary laminated diaphragms, said disks being each formed preferably of mica about one-thousandth of an inch thick. After each of the laminated sections is thus constructed, a cen-

tral opening as shown is punched through the same, and radial slots 3 and 4 are formed therein by any suitable cutting tool or die. The slots 3 of the section 1, 1^a and 1^b are staggered with reference to the slots 4 of section 2, 2^a and 2^b, and the sections are then preferably cemented together, for instance, by rubber cement.

To properly cover the central opening formed in the diaphragm in such a way that the free vibration of the reeds formed by slotting the same, may not be interfered with, I make use of a pair of light metal disks 5—5, corrugated as shown so as to be as stiff as possible, and made preferably of aluminium or metallic magnesium, and these disks are seated on rubber gaskets 6 and are held together by a very small bolt 7 and nut 8. With the bolt 7 the usual connection to the recorder or reproducer diaphragm may be made.

Having now described my invention what I claim as new therein, and desire to secure by Letters Patent is as follows:

1. A diaphragm for talking machines formed of two sections, each having radial slots and the slots of one section being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

2. A diaphragm for talking machines comprising two sections cemented together, each section being radially slotted and the slots of one section being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

3. A diaphragm for talking machines comprising two laminated sections, each formed with radial slots and the slots of one section

being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

4. A diaphragm for talking machines formed with radial slots so as to result in the production of a series of reeds, and means for closing said slots without materially affecting the vibrating capacity of said reeds, substantially as and for the purposes set forth.

5. A talking machine diaphragm provided with radial slots so as to form a series of reeds and a disk secured to the diaphragm and closing said slots without materially affecting the vibrating capacity of the reeds, substantially as and for the purposes set forth.

6. A talking machine diaphragm provided with a central opening and a series of radial slots, of a disk secured to the diaphragm so as to cover the central opening, substantially as and for the purposes set forth.

7. A talking machine diaphragm provided with a central opening and a series of radial slots, of a disk secured to the diaphragm so as to cover the central opening, said disk being seated on an elastic gasket, substantially as and for the purposes set forth.

8. A talking machine diaphragm formed with a central opening and a series of radial slots, of a pair of metallic disks connected together and engaging the opposite faces of the diaphragm and covering said opening, substantially as and for the purposes set forth.

This specification signed and witnessed this 23rd day of February 1907.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.

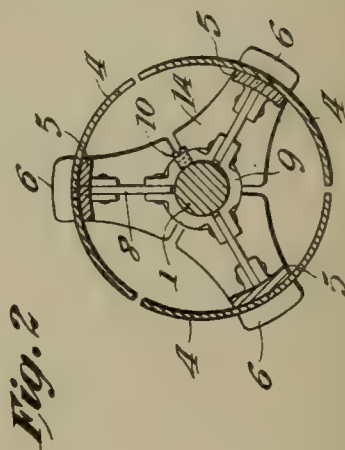
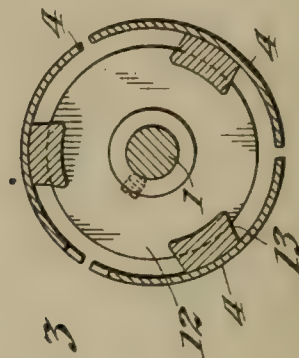
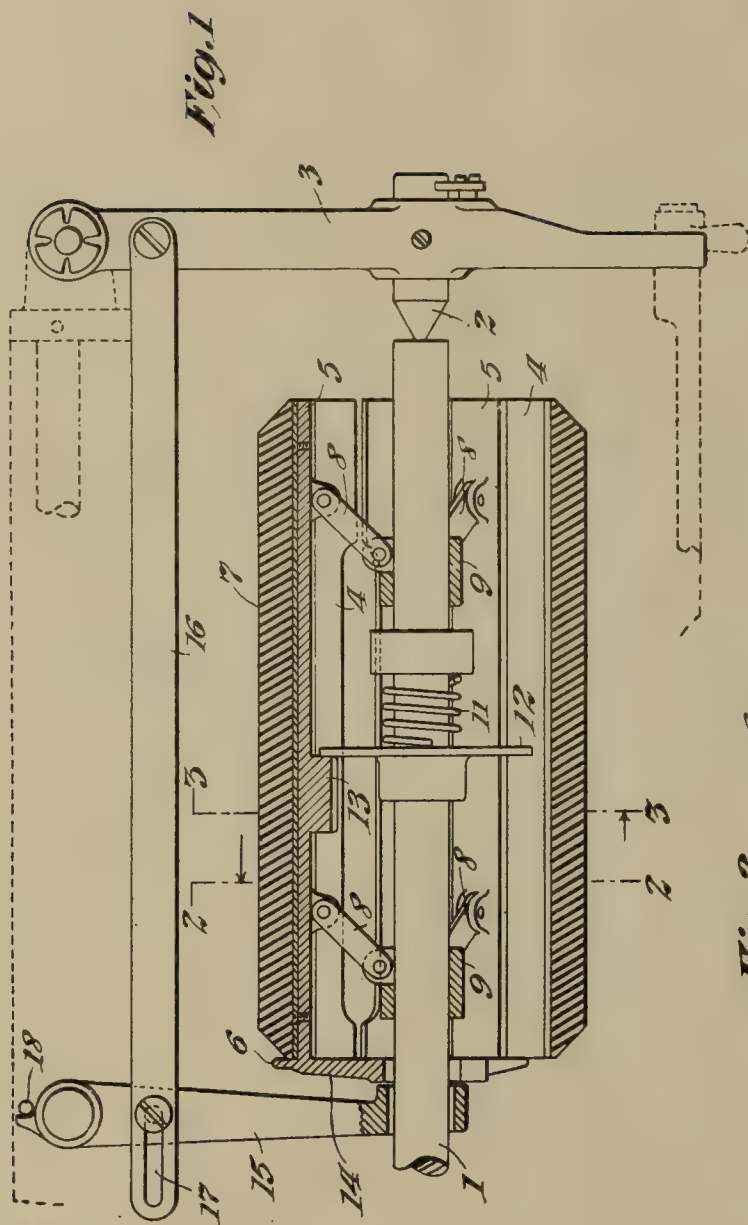
No. 855,604.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH & F. L. DYER.

PHONOGRAPH.

APPLICATION FILED MAY 8, 1906.



Witnesses:
Frank D. Lewis
Anna R. Kuhn

Inventors:
Jonas W. Aylsworth and
Frank L. Dyer
by Frank L. Dyer, Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, AND FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 855,604.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 8, 1906. Serial No. 315,716.

To all whom it may concern:

Be it known that we, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, and FRANK L. DYER, a citizen of the United States, residing at Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

Our invention relates to improvements in phonographs, and particularly to a new and improved mandrel for the same, adapted to receive and securely hold cylindrical records having perfectly cylindrical bores.

Our object is to provide a simple and effective device for the purpose and to this end the invention consists of a mandrel formed of a plurality of sections, outwardly movable so as to engage the record and securely hold the same, means being preferably provided to contract the mandrel sections when the ordinary phonograph end-gate is opened for the purpose of permitting the record to be taken off.

In order that the invention may be better understood, attention is directed to the accompanying drawing, and in which—

Figure 1, is a longitudinal sectional view, showing a part of the phonograph with our present improvements thereon, and Fig. 2, a cross sectional view on the line 2—2 of Fig. 1. Fig. 3 is a similar section on the line 3—3 of Fig. 1.

In all of these views, corresponding parts are represented by the same numerals of reference.

1 represents the ordinary mandrel shaft, the free end of which is mounted on a center 2, carried by the usual end gate 3. The mandrel comprises a plurality of sections 4, preferably formed of sheet metal carried on longitudinal ribs 5, the latter being formed with shoulders 6, to act as stops for the record 7. The record as shown is formed with a perfectly cylindrical bore. The longitudinal ribs 5 are mounted on links 8—8 carried on sleeves 9—9, at least one of which is secured to the mandrel shaft 1, as by a set screw 10. It will be obvious that if pressure is applied to swing the outer ends of the links 8 to the left (Fig. 1), the mandrel sections 4—4 will

be brought into engagement with and will tightly grip the bore of the record. This movement is preferably effected by a spring 11, surrounding the mandrel shaft and engaging a disk 12, which is in contact with lugs 13 on the ribs 5. Obviously, the tension of the spring 11 tends to hold the mandrel sections in engagement with the record. Preferably, the construction of the device is such that when the end gate 3 is opened the mandrel sections will be contracted so as to permit the record to be removed. To this end, we form the ribs 5 with inwardly extending arms 14, with which the end of the lever 15 is adapted to engage, said lever being pivoted to the frame of the machine. A link 16 extends between the end gate 3 and the lever 15, said link being formed with a slot 17, so as to permit the end gate to be almost completely opened before movement of the lever 15 is effected. As the lever 15 is moved, the mandrel sections will be swung toward the right in Fig. 1, and will be withdrawn inwardly away from the record as will be understood. The inward movement of the mandrel sections can continue only until the arms 14 are brought into contact with the mandrel shaft 1. If desired a stop pin 18 may be employed for limiting the retractive movement of the lever 15, although this is not necessary.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is as follows:—

1. In a phonograph, the combination with the mandrel shaft and end gate, of an expansible mandrel carried by the mandrel shaft, and connections between the mandrel and end gate for contracting the mandrel when the end gate is opened, substantially as set forth.

2. In a phonograph, the combination with a mandrel shaft and end gate, of a sectional and expansible mandrel carried by said shaft, a lever for contracting the mandrel sections and connections between said lever and end gate, substantially as set forth.

3. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial movement, a mandrel shaft and inwardly extending arms on the mandrel sections adapted to contact with the mandrel shaft and limit the motion of the man-

drel sections inwardly, substantially as set forth.

4. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial movement, a mandrel shaft, inwardly extending arms on the mandrel sections adapted to contact with the mandrel shaft and limit the motion of the mandrel sections inwardly, and stops on the mandrel sections to position the record on the mandrel, substantially as set forth.

5. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial movement, a mandrel shaft, a system of linkages by which the mandrel sections are connected to the mandrel shaft and stops on the mandrel sections to limit the inward movement thereof, substantially as set forth.

6. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial movement, a mandrel shaft, a system of linkages by which the mandrel sections are connected to the mandrel shaft, stops on the mandrel sections to limit the inward movement thereof and stops on the mandrel sections to position the record on the mandrel, substantially as set forth.

7. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial expansion, a mandrel shaft, means allowing radial movement of the mandrel sections interposed between the mandrel sections and the mandrel shaft, and means on the mandrel sections for limiting the inward movement thereof, substantially as set forth.

8. In a phonograph, an expansible mandrel composed of a plurality of sections capable of radial movement, a mandrel shaft, pivoted links connecting said sections to the shaft, lugs projecting inwardly on the inner sides of said sections, a slidable collar and a fixed collar on the mandrel shaft the slidable collar being in engagement with said lugs, a spring interposed between said collars, and means for limiting the expansion of said mandrel sections, substantially as set forth.

9. In a phonograph, the combination of a mandrel shaft, an end gate, an expansible mandrel carried by the mandrel shaft, and means under the control of the end gate for contracting the mandrel when the end gate is open, substantially as set forth.

10. In a phonograph, the combination with a mandrel shaft and end gate, of a sectional and expansible mandrel carried by said shaft, a lever for contracting the mandrel sections, connections between said lever and end gate, and means to limit the movement of the lever away from the end gate, substantially as set forth.

11. In a phonograph, the combination with a mandrel shaft and end gate, of a sectional and expansible mandrel carried by said shaft, a lever for contracting the mandrel sections, connections between said lever and end gate, and spring actuated means for expanding said mandrel, substantially as set forth.

12. In a phonograph, the combination with a mandrel shaft and end gate, of a sectional and expansible mandrel carried by said shaft, a lever for contracting the mandrel sections, connections between said lever and end gate, means to limit the movement of the lever away from the end gate, and spring actuated means for expanding the mandrel, substantially as set forth.

13. In a phonograph, the combination with a mandrel shaft and end gate, of a sectional and expansible mandrel carried by said shaft, a lever for contracting the mandrel sections, and lost motion connecting means between said lever and end gate, substantially as set forth.

14. In a phonograph, the combination with a mandrel shaft and end gate, of an expansible mandrel carried by the mandrel shaft, and lost motion connecting means between the mandrel and end gate for contracting the mandrel when the end gate is open, substantially as set forth.

15. In a phonograph, the combination with a mandrel shaft and end gate, of an expansible mandrel carried by the mandrel shaft and means operated by the end gate for contracting the mandrel, the said means being inoperative during the first movement of the end gate but becoming operative as the end gate is opened more widely, substantially as set forth.*

This specification signed and witnessed this seventh day of May, 1906.

JONAS W. AYLSWORTH.

FRANK L. DYER.

In presence of—

ANNA R. KLEHM,
FRANK D. LEWIS

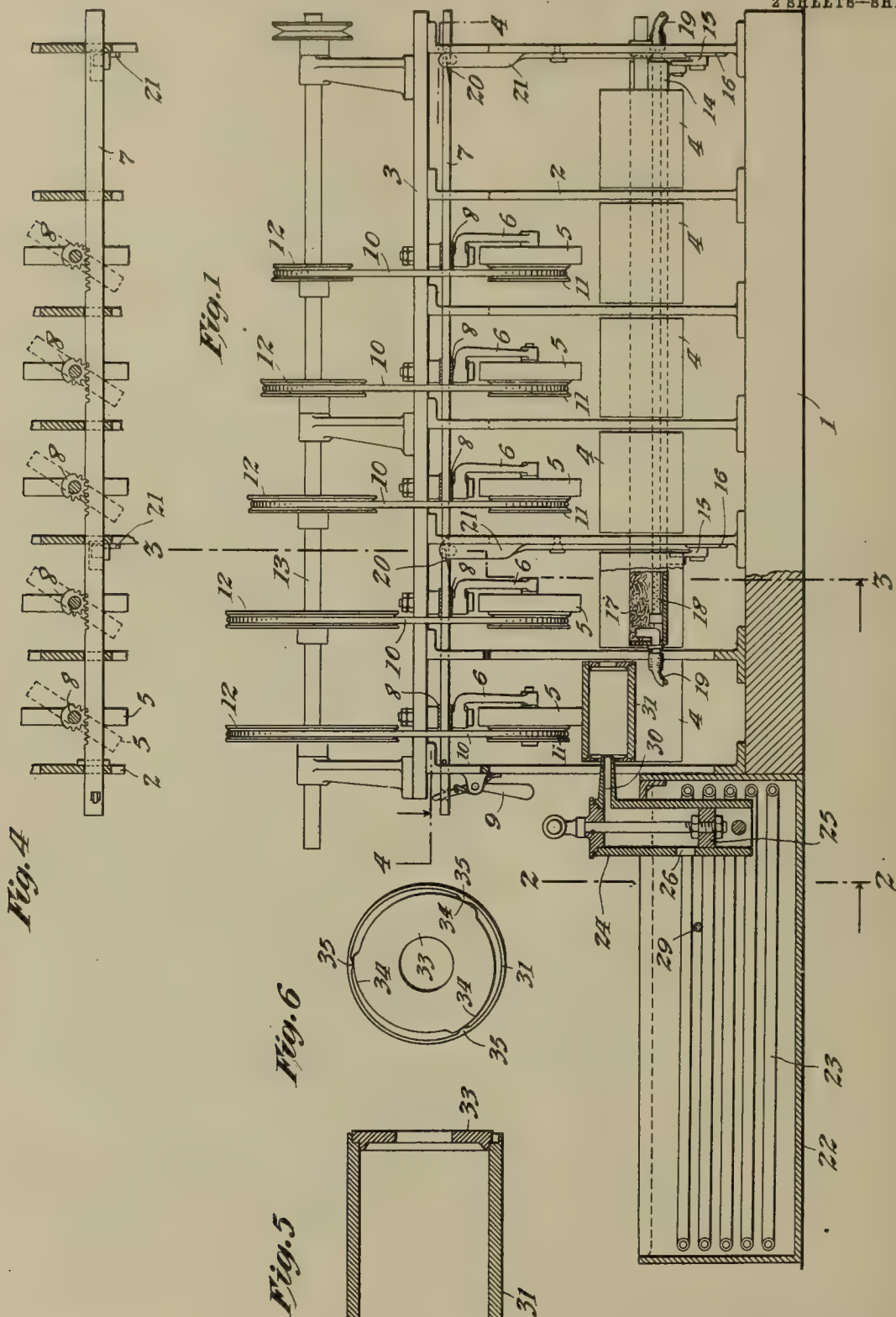
No. 855,605.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.
PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.

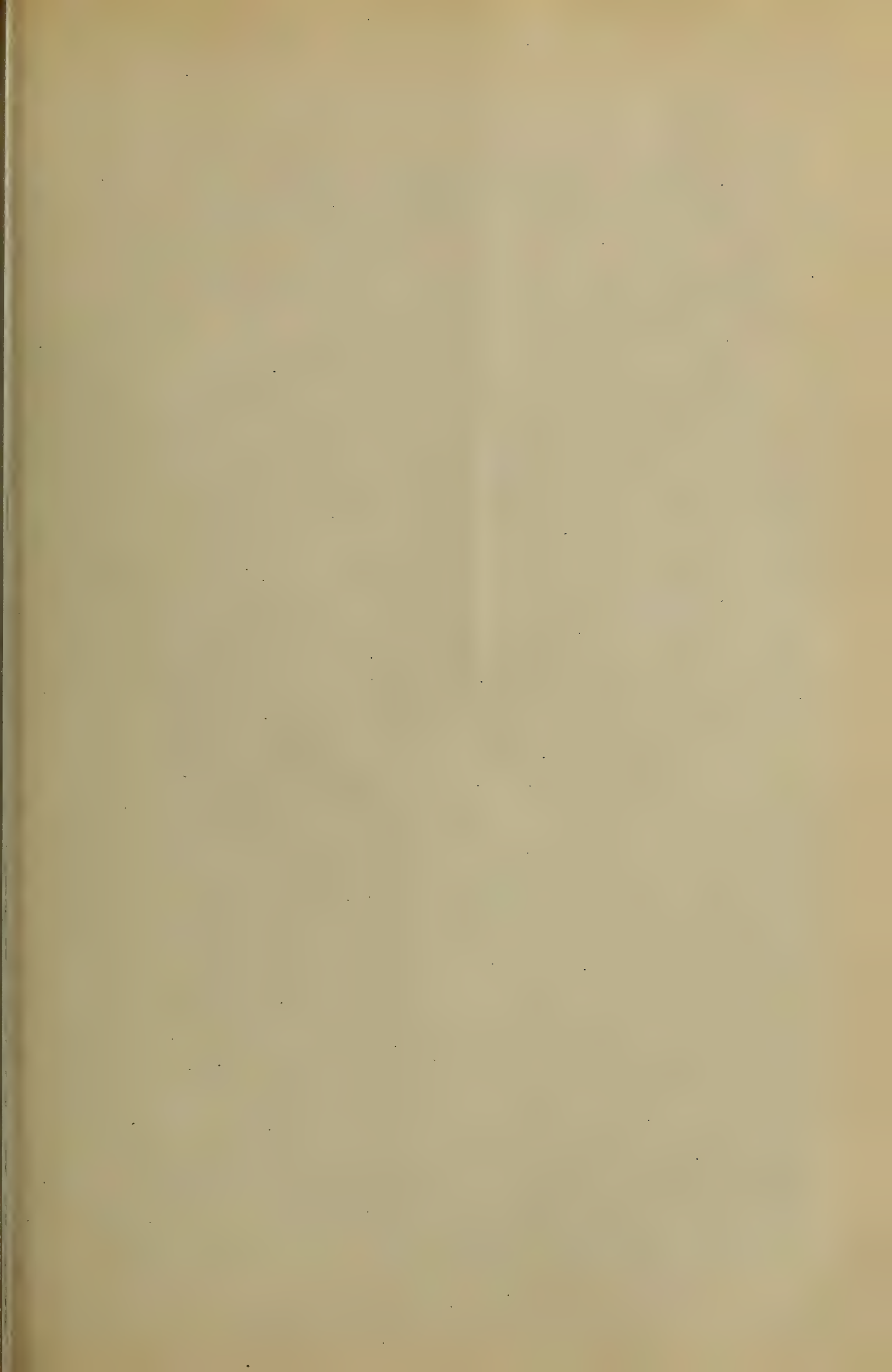
APPLICATION FILED MAY 11, 1906.

2 SHEETS—SHEET 1.



Witnesses:
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No. 855,605.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.

PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED MAY 11, 1906.

2 SHEETS—SHEET 2.

Fig. 3

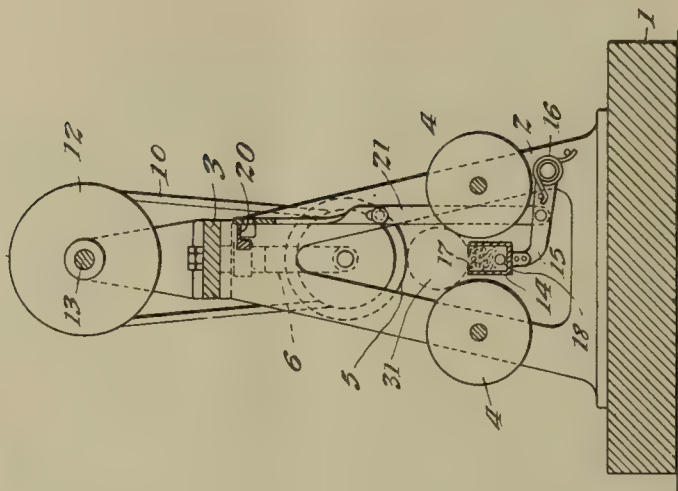
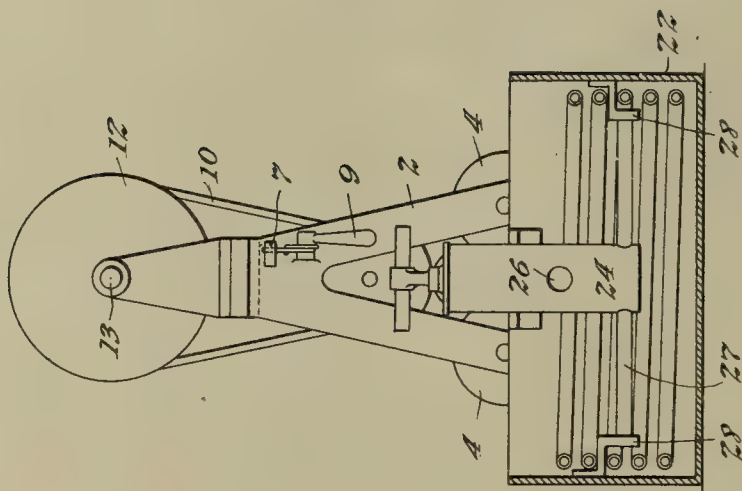


Fig. 2



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING DUPLICATE PHONOGRAPH-RECORDS.

No. 855,605.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 11, 1906. Serial No. 316,250.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Processes of Making Duplicate Phonograph-Records, of which the following is a description.

My invention relates to an improved process for making duplicate phonograph records, and my object is to provide a process for the purpose by which duplicate phonograph records may be produced at low cost, of superior quality, and whereby the percentage of imperfect records or "discards" obtained in actual manufacture will be very largely reduced.

In the present development of the phonographic art, it is possible to make matrices or molds which for all practical purposes are mathematically exact negative copies of the original master records, and several processes have been suggested and commercially used for obtaining duplicates from these matrices or molds. In a practical duplicating process, it is important that the temperatures used should not be too high, since the material from which the records are made contains considerable quantities of free stearic acid, which in the presence of a high temperature attacks and roughens the surface of the mold, even when the latter is protected by a non-oxidizing film of gold or nickel. These molds are very expensive and the slightest roughening is manifested in the reproduction from a record obtained from the same. Hence, it is important that the temperatures should be kept in the neighborhood of the melting point of the material, or at best, only a few degrees above the same, in order that the life of the molds may be prolonged as much as possible. In working with the material at relatively low temperatures another difficulty is encountered, namely, the formation of air and gas bubbles, which appear on the surface of the record. These bubbles are sometimes caused by the trapping of air in the mold, even when great care is taken to avoid the difficulty, and some are caused by the decomposition of the material in its original manufacture, or when scrap material is remelted. The low temperature at which the

material is worked makes it more or less viscid, and hence the bubbles do not have the opportunity of freely escaping, but move sluggishly through the mass.

By my present invention, I am enabled to produce duplicate records in a highly efficient and economical manner, the material being maintained in a molten state at not necessarily more than a few degrees above the melting point, so as to prevent it from attacking and corroding the mold, while at the same time, the operation is such that air and gas bubbles are effectively prevented from appearing on the record surface.

To this end, the invention consists in making duplicate records by centrifugal force, the mold being rotated at a sufficiently high speed and the molten material being introduced therein so as to be forced outwardly and distributed evenly around the entire bore of the mold, the mold being heated to about the temperature of the molten material, so that when the molten material is introduced therein, it will not chill on the mold, but will retain its fluid state, thereby permitting its complete and uniform distribution to be effected and allowing all bubbles to be displaced and forced into or through the body of material. This forcing of the bubbles inwardly away from the surface of the record can be effected rapidly and perfectly, since the tendency of the material to displace the bubbles, (provided the speed of rotation is high enough) may be made very much more decided than if the bubbles are allowed merely to float to the surface as at the present time. Consequently, by using centrifugal force, bubbles may be effectively forced back from the record surface even when such bubbles are so minute that their tendency to rise to the surface of the material is not sufficient to overcome the natural viscosity of the material. Yet, these very minute bubbles which are due to decomposition within the material are prominent enough to seriously affect the character of the reproduction. Having introduced the molten material in the rapidly turning mold, so as to uniformly distribute the material over the bore of the mold, it is of course important that the mold should continue to rotate until the material becomes hard enough to retain its shape, but obviously the speed of ro-

tation can be gradually reduced as the material becomes gradually hardened.

It will of course be understood that the general principles of the invention can be carried out in many different ways, and in many different forms of apparatus. Preferably, however, the apparatus is one in which a practically continuous process can be carried on, a succession of molds being at all times undergoing treatment, so that when, for example, the step of introducing the molten material into one of the molds, is being carried out, the record will be practically finished in a previously introduced mold in which the several operations have been performed, all as I will more fully hereinafter describe and claim.

In the accompanying drawings, forming part of this specification, I illustrate a convenient apparatus for the purpose, said apparatus being simple in construction and capable of effective operation by comparatively unskilled labor.

In these drawings—Figure 1, is a side elevation, partly in section, Fig. 2, a cross-sectional view on the line 2—2 of Fig. 1, Fig. 3, a similar view on the line 3—3 of Fig. 1, Fig. 4, a horizontal sectional view on the line 4—4 of Fig. 1, Fig. 5, a longitudinal sectional view of the mold showing the end plates in position, and Fig. 6, an end view of the same illustrating the removable end plate.

In all of the above views, corresponding parts are represented by the same numerals of reference.

Carried by a heavy substantial base 1 are the frames 2—2, rigidly connected at their upper ends by a top plate 3. Mounted between the frames 2 are rollers 4—4, arranged in pairs and independently rotatable, so that they may turn at any desired speed. These rollers are not independently driven, but act merely as roller supports for the molds as the latter are rotated. The molds are rotated by a series of driving rollers 5—5 having preferably rubber or fiber peripheries, so as to increase the friction on the mold. These driving rollers are carried by brackets 6—6 and normally occupy the position shown in full lines (Fig. 4) so as to turn in a plane perpendicular to the axis of the molds. By skewing the driving rollers from their normal position as shown in dotted lines (Fig. 4) the molds would not only be rotated as desired, but will be moved longitudinally, as will be understood, so as to engage with and be supported by the successive idler rollers 4—4, moving in this way from the left to the right of the machine in Fig. 1.

The skewing of the driving rollers is effected by any suitable mechanism; for instance a rack bar 7, engaging toothed segments 8 on the bracket 6 of each roller and operated by a handle 9, whereby all the rollers will be moved axially. The driving rollers

5 are rotated by suitable mechanism, such as belts 10, engaging pulleys 11, carried by the driving rollers and driven by pulleys 12 on the main shaft 13. I illustrate the first two pulleys 12 at the left as being of the same diameter so as to rotate the molds at the same speed during the first two stages of the operation, the succeeding pulleys being of gradually reduced dimensions, so as to rotate the molds at less speed. Provision is made for cooling the molds after the material has been uniformly distributed therein, so as to effect a chilling and solidifying of the material, and for this purpose I illustrate a trough 14, located between the idler rollers 4, beginning with the second set thereof, since of course the molds should not be chilled during the introduction of the material therein. This trough is carried on arms 15 adapted to be normally pressed upwardly by a spring 16, so as to engage the molds with a light elastic pressure. The trough 14 is substantially filled with a loose absorbent material 17, such as fiber or sponge. Cooling water is admitted to the trough 14, through a perforated pipe 18, so as to always keep the absorbent material fully saturated. The inlet and overflow pipes are connected by rubber sections 19, so as to permit the trough to be moved up and down into and out of engagement with the molds. The trough 14 is moved downwardly when the rollers are skewed to permit the molds to move longitudinally. This movement may be derived from the rack bar 7 by forming the same with cams 20, with which engage rollers on the rods 21, the latter being connected to the pivoted arms 15. Obviously, as the rack bar 7 is moved to the right to skew the rollers, the trough 14 will be depressed so as to withdraw the absorbent material from contact with the molds. The molten material may be contained in a tank 22 heated in any suitable way as for instance, by a steam coil 23. Mounted in the tank 22 is a simple form of pump 24, the piston 25 of which is adapted to travel below an inlet 26, so as to permit the molten material to enter the pump cylinder above the piston to thereby give always a definite charge of material, assuming the level of the latter, (shown in dotted lines, Fig. 1) to be constantly maintained. The pump 24 is carried on a bar 27 mounted to turn in brackets 28 secured to the sides of the tank 22. When the molds are being successively introduced into the machine, the pump is swung rearwardly to occupy an inclined position, resting on the stop 29. At all times, it will be observed that the pump cylinder is more or less immersed in the molten material, so as to be effectively heated by the same, and thereby preventing congealing. The discharge of the pump comprises a nozzle 30, adapted, when the pump cylinder is in a vertical posi-

tion, to enter the mold 31. These molds are of any suitable type and are formed in any suitable manner. Preferably, they are provided with the ordinary end piece 32, on which the name of the selection is engraved or electrotyped, and with a removable end piece 33 at the other end, so that the molten material will be confined within the mold as the latter rotates. The removable end piece 33 fits the end of the mold very snugly, so as to prevent leakage of the molten material at this point, and is locked in position in any suitable way. For instance, I show the same as being formed with a series of cams 34, adapted to engage projections 35, formed on the mold, so that by inserting the end piece 33 in position, and giving it a partial turn, it will be locked frictionally firmly in place.

In carrying out my invention with apparatus of this general type, and assuming the tank 22 to contain the molten material (for instance the composition described in my Patent No. 782,375 dated February 14, 1905) maintained at a temperature from 10 to 25 degrees above its melting point, I proceed as follows: The handle 9 is operated so as to swing the driving rollers 5 to or toward the position shown in dotted lines (Fig. 4) and one of the molds 31 being placed on the first set of idler rollers 4—4 and engaged by the corresponding driving rollers 5, will by the latter be turned at the desired high speed and at the same time will be moved longitudinally to the position shown in Fig. 1. The handle 9 is now returned so that the mold will be rotated in this position. The pump 24 is now swung to its vertical position and the plunger is elevated, carrying the charge of molten material and discharging the same into the rotating mold, the temperature of which has been previously heated up to or preferably slightly a little more than the temperature of the molten material. The molten material will, therefore, be distributed uniformly throughout the mold and by reason of the centrifugal force developed will be maintained in its liquid state and evenly disposed over the record surface, so as to take a very perfect impression therefrom. Since the temperature of the material is somewhat higher than its melting point, and since the mold is preferably at or about the same temperature, the material remains perfectly fluid during the time that it is being disposed over the record surface; and consequently ample opportunity is offered for displacing any bubbles, however minute, and forcing them radially inward. Even if these bubbles do not entirely escape through the liquid material, they are at least driven in from the record surface, which will therefore be perfect and free from bubbles. As soon as the charge of material has been delivered to the molds, the

pump is swung rearwardly. The handle 9 is again operated to skew the driving rollers 5, and the mold with its charge of material therein will be advanced longitudinally so as to be engaged by the second driving roller and brought into position over the second set of idlers. At the same time, a new mold is introduced over the first set of idlers and is filled with material, as explained. When the mold with its charge of material therein has been thus advanced from the first section of the machine where the filling operation takes place, it will, when normally rotated by the successive driving rollers, be engaged by the cooling pad in the trough 14. These operations are repeated, the filled molds progressing step by step toward the right of the machine and being rotated at successively reduced rates, as the material is gradually cooled and becomes solid. I prefer to dispense with a driving roller in connection with the last set of idlers, at which point the material will be sufficiently solidified to retain its shape, the mold with its contents being then removed from the machine. The cap 33 is now removed and after the record has been contracted sufficiently away from the bore of the mold, it is removed. By always introducing a fixed and definite charge of material into the mold, the necessity for reaming the bore of the finished duplicate records is done away with, although this operation can be performed if considered desirable. It will furthermore be seen that by using two end caps, the duplicate records will be finished at both ends when removed from the mold. If it is desired to provide the duplicate records with tapering bores, this may be effected by arranging the idler rollers 4 on an incline or by inclining the entire machine to a sufficient extent, whereby the material when introduced into the mold, will accumulate to a greater extent at the lower end than at the upper end and will set in this position, after which the bore, if not straight, may be finished by reaming, or a tapering bore may be entirely formed by a reaming operation, as will be understood.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. The process of making duplicate records, which consists in rotating a hot mold at a high speed, and in introducing molten material therein, whereby the material will be compressed by centrifugal force against the record surface and be uniformly distributed over the same, substantially as set forth.

2. The process of making duplicate records, which consists in rotating a hot mold at a high speed, in introducing molten material therein, whereby the material will be compressed by centrifugal force into intimate engagement with the record surface, and in

cooling the mold and its contents while the mold is being continuously rotated, substantially as set forth.

3. The process of making duplicate records, which consists in rotating a hot mold at a high speed, in introducing molten material therein, whereby the material will be compressed by centrifugal force into engagement with the record surface, in applying successive cooling applications to the mold for chilling its contents, and in successively reducing the speed of rotation of the mold, substantially as set forth.

4. The process of making duplicate records, which consists in rotating a hot mold at a high speed, and in introducing a fixed and definite charge of molten material therein, whereby the material will be compressed by centrifugal force against the record surface and the desired thickness thereof will be defined, substantially as set forth.

5. The process of making duplicate records, which consists in rotating a hot mold at a high speed, in introducing molten material therein, whereby the material will be compressed by centrifugal force into engagement with the record surface, in replacing the filled mold by an empty mold rotated at high speed, in continuing the rotation of the filled mold and simultaneously applying a cooling medium to the same, and in introducing a charge of molten material into the empty mold, substantially as set forth.

6. The process of making duplicate records, which consists in rotating at a high speed, a hot mold having end plates, and in introducing within the mold a charge of molten

material, whereby the material will be compressed by centrifugal force into engagement with the record surface to form a duplicate record, whose ends will be simultaneously finished, substantially as set forth.

7. The process of making duplicate records, which consists in rotating at a high speed a hot mold having end plates, and in introducing therein a fixed and definite charge of molten material which will be compressed by centrifugal force against the record surface to form a duplicate record, whose bore and ends will be simultaneously finished, substantially as set forth.

8. The process of making duplicate records which consists in rotating at a high speed a hot mold containing molten material whereby the material will be compressed by centrifugal force against the record surface and be uniformly distributed over the same, substantially as set forth.

9. The process of making duplicate records which consists in rotating at a high speed a hot mold containing molten material whereby the material will be compressed by centrifugal force against the record surface and be uniformly distributed over the same, in cooling the mold and its contents so as to cause the record to shrink with respect to the mold, and in then withdrawing the record from the mold, substantially as set forth.

This specification signed and witnessed this 9th day of May 1906.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
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833606

No. 855,606.

PATENTED JUNE 4, 1907.

J. W. AYLSWORTH.

PROCESS OF MAKING DUPLICATE SOUND RECORDS.

APPLICATION FILED MAY 31, 1906. RENEWED APR. 23, 1907.

4 SHEETS—SHEET 1.

Fig. 1

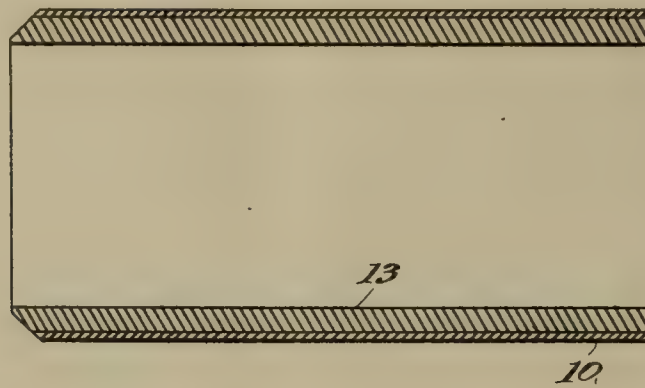


Fig. 2

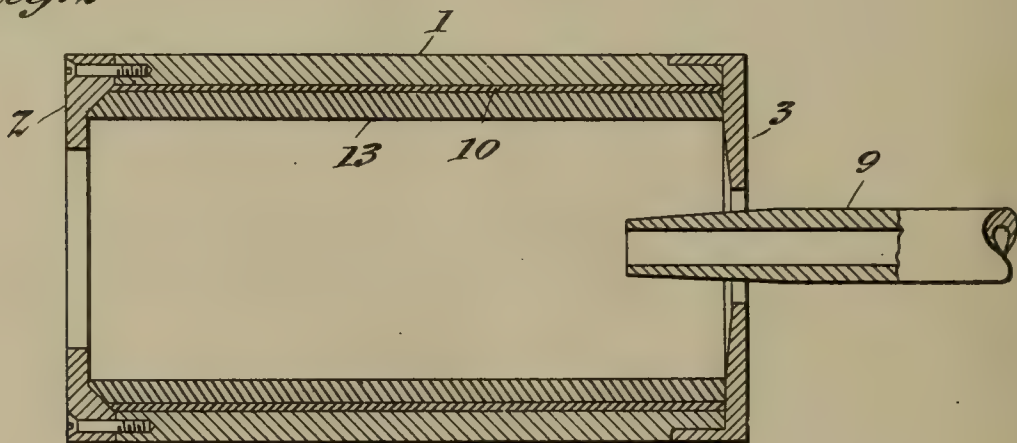
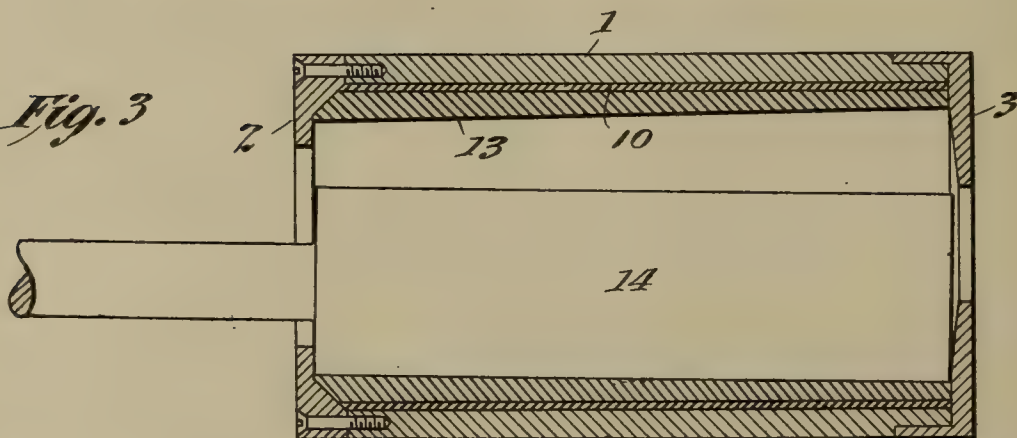
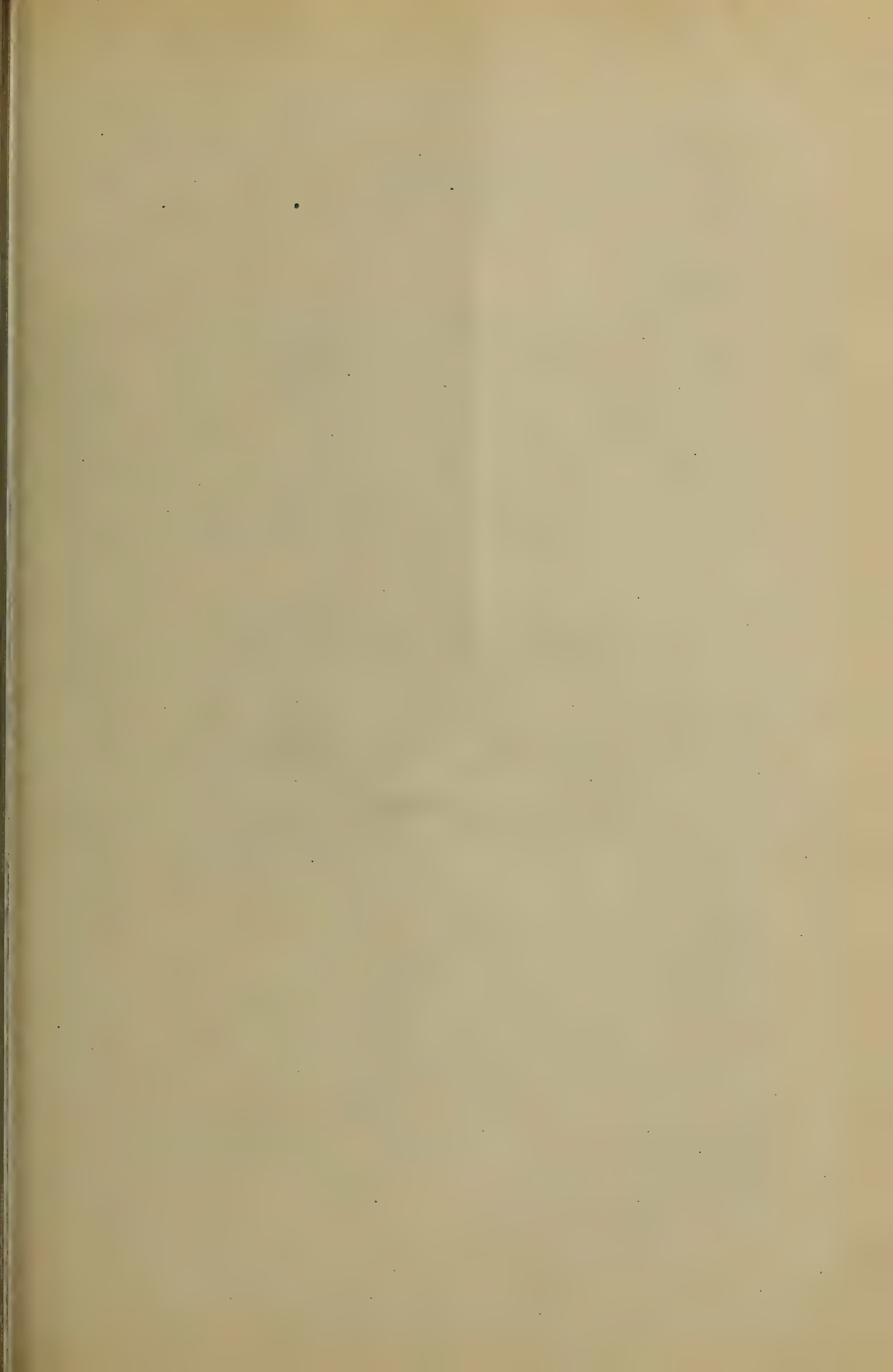


Fig. 3



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J. W. AYLSWORTH.
PROCESS OF MAKING DUPLICATE SOUND RECORDS.

APPLICATION FILED MAY 31, 1906. RENEWED APR. 23, 1907.

4 SHEETS—SHEET 2.

Fig. 4

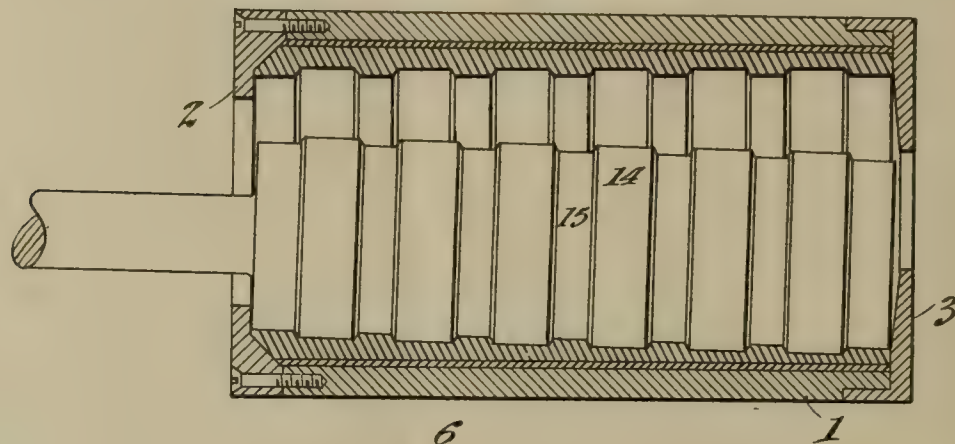


Fig. 5

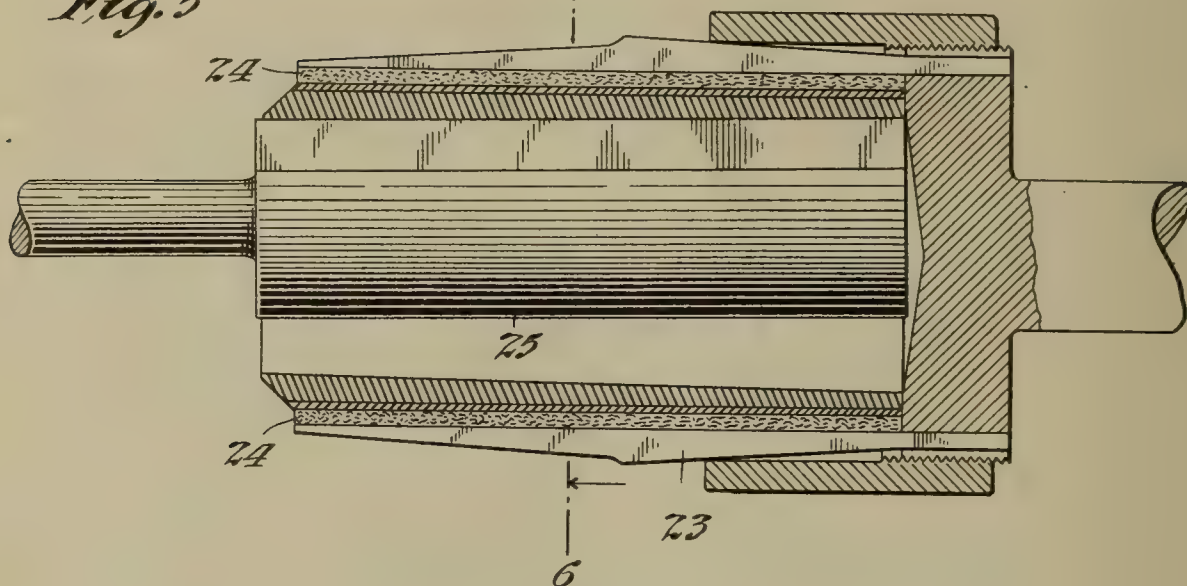
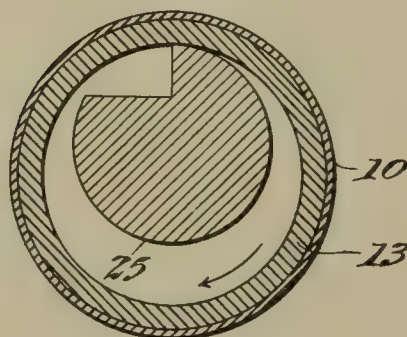


Fig. 6



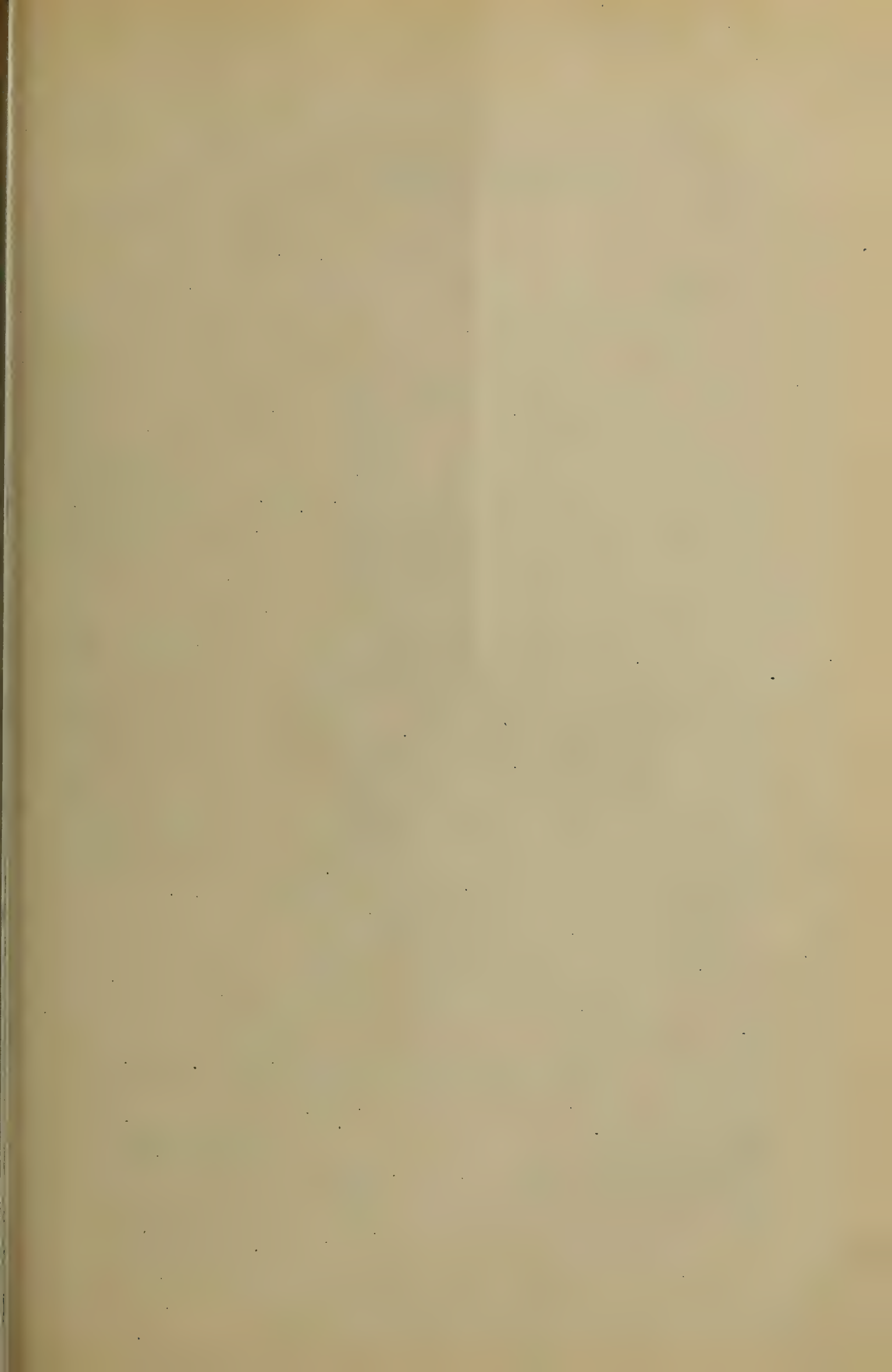
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No. 855,606.

PATENTED JUNE 4, 1907.

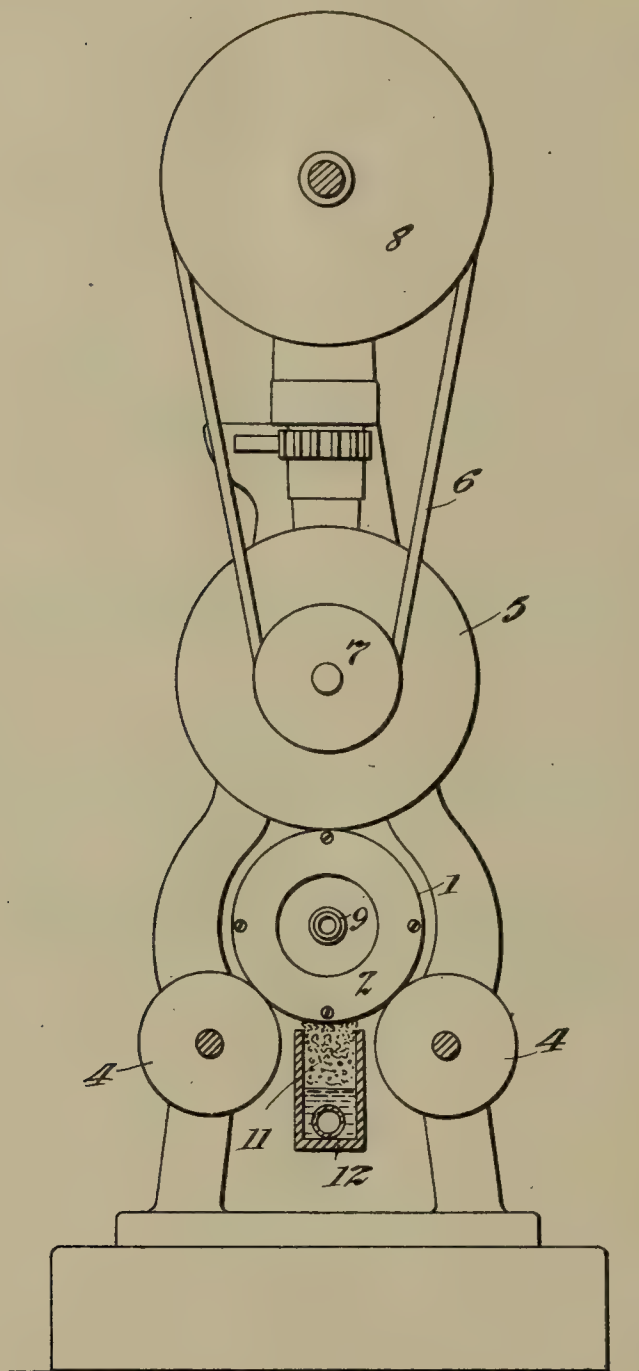
J. W. AYLSWORTH.

PROCESS OF MAKING DUPLICATE SOUND RECORDS.

APPLICATION FILED MAY 31, 1906, RENEWED APR. 23, 1907.

4 SHEETS—SHEET 3.

Fig. 7

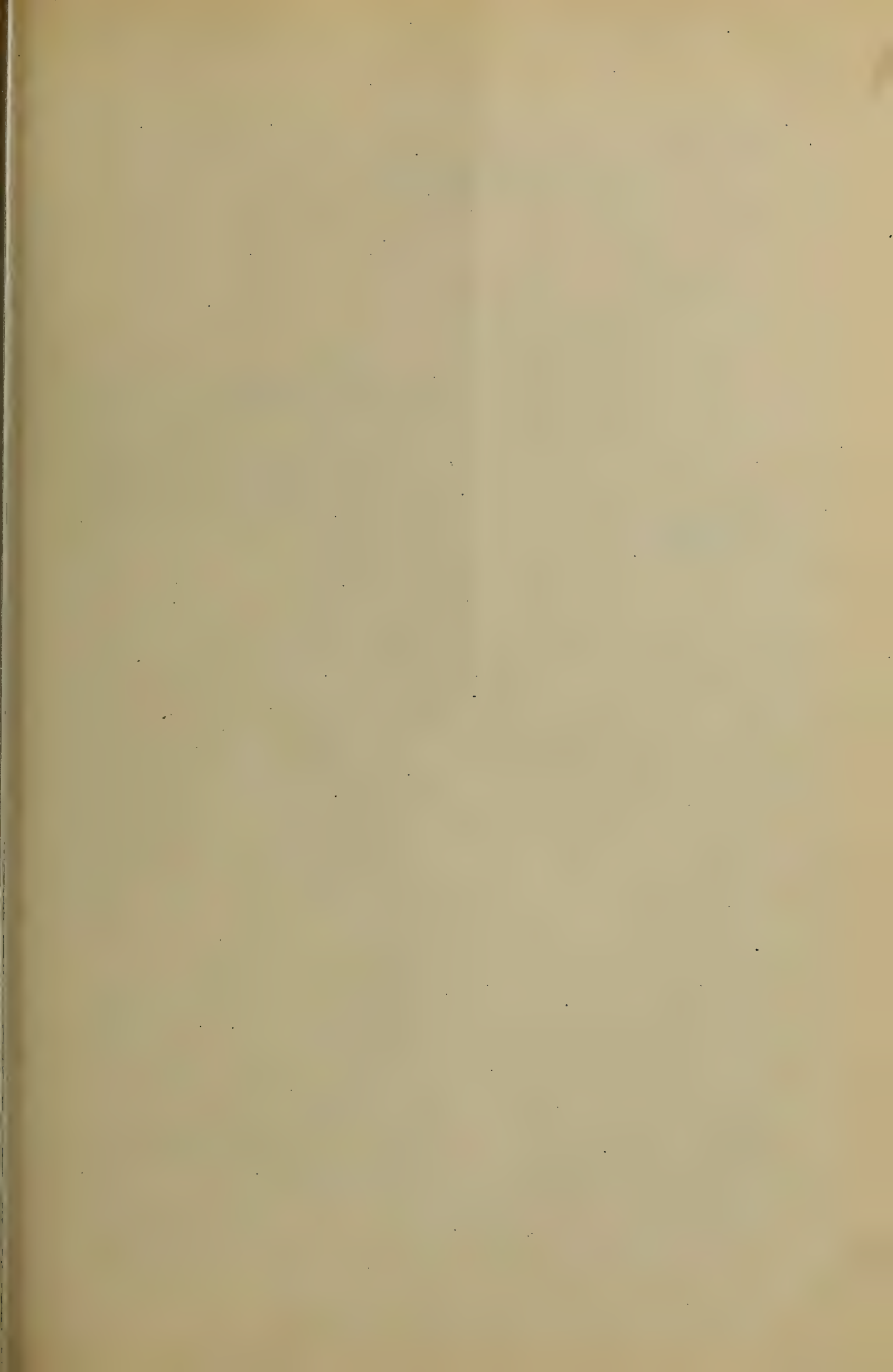


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PROCESS OF MAKING DUPLICATE SOUND RECORDS.
APPLICATION FILED MAY 31, 1906. RENEWED APR. 23, 1907.

4 SHEETS—SHEET 4.

Fig. 8

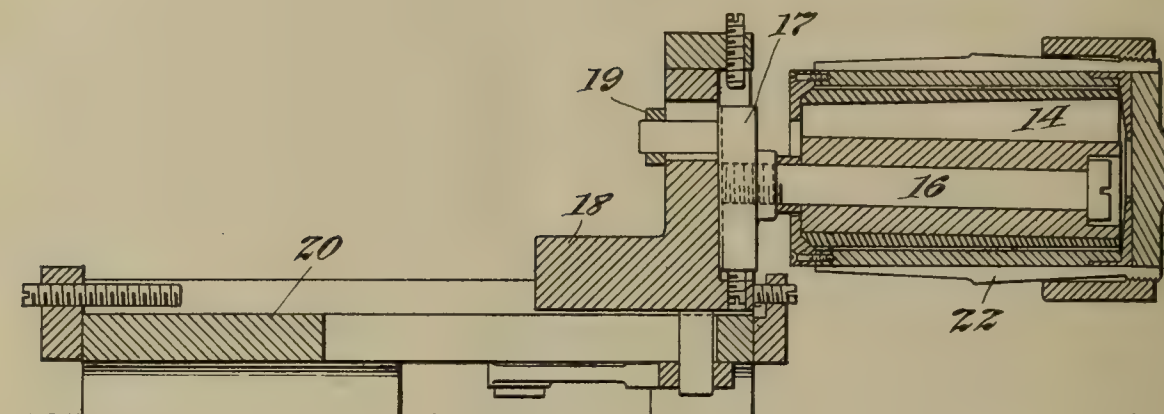


Fig. 9

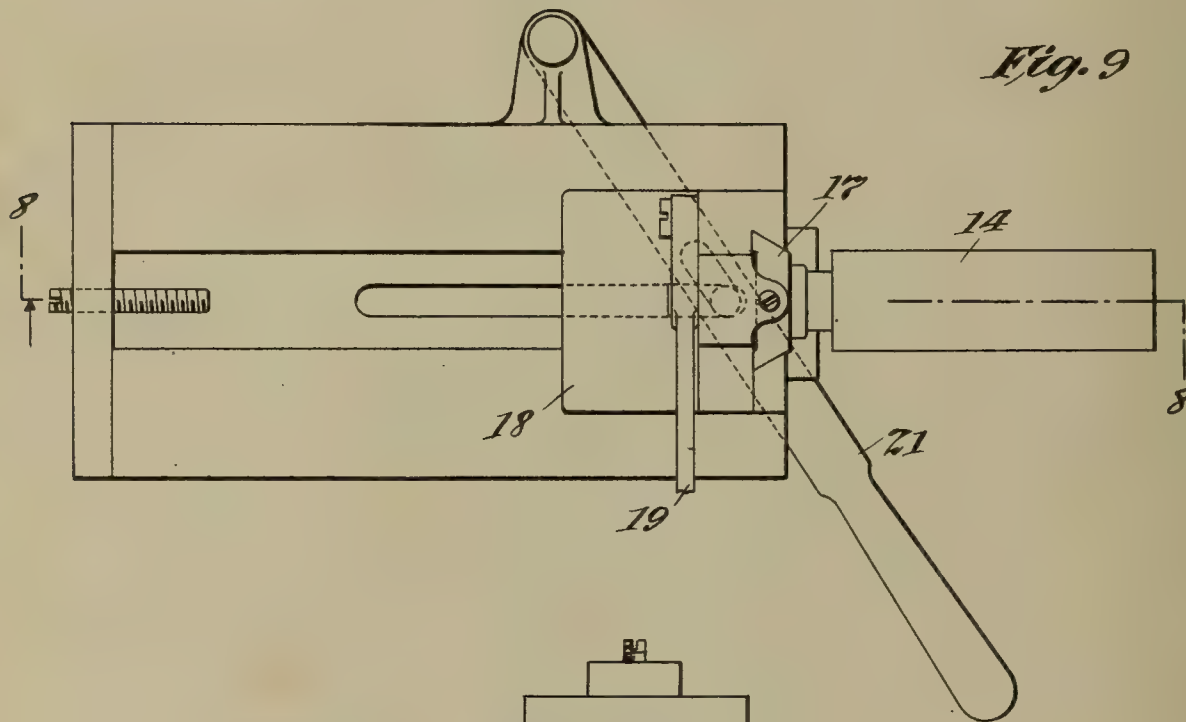
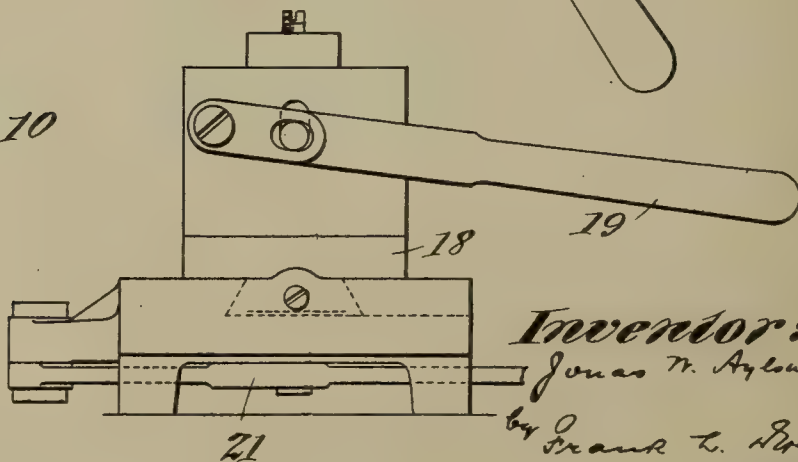


Fig. 10



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING DUPLICATE SOUND-RECORDS.

No. 855,606.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed May 31, 1906. Renewed April 23, 1907. Serial No. 369,755.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Processes of Making Duplicate Sound-Records, of which the following is a description.

My invention relates to an improved process for the manufacture of duplicate phonograph records, being particularly adapted for the production of an improved record which will be claimed in another application, but which may be employed for the manufacture of records of other types. The improved record referred to is a composite cylindrical structure having an outer layer of a tough, smooth, amorphous material, in which the record surface is formed and from which a smooth and brilliant reproduction can be obtained, and a main body or support therefor composed of a very cheap and tough material unsuitable itself for receiving a record surface, the two layers being welded together so as to constitute practically a single homogeneous structure, as I will more fully hereinafter describe and claim.

The improved process is one in which the material in a molten state or in solid or powdered form is introduced into a rapidly rotating mold, as I describe in applications filed May 11th, 1906, Serial No. 316,250 and May 16th, 1906, Serial No. 317,082 and 317,083, the outer layer being first formed by the centrifugal force developed and, when the material thereof is sufficiently set but preferably while still slightly plastic, the material to constitute the inner or main layer is introduced so as to be intimately welded to the outer layer.

The process also contemplates the carrying on of operations by which the interior of the record may be suitably developed to fit the supporting mandrels of talking machines of the phonograph type, although if an expanding mandrel is employed as disclosed in the application of Aylsworth and Dyer, filed May 8th, 1906, Serial No. 315,716, no separate finishing operation is necessary, since when the records are removed from the molds after being chilled therein, they will, as an inher-

ent result of the process, be formed with perfectly smooth cylindrical bores.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a longitudinal sectional view of the improved duplicate phonograph record, Fig. 2, a similar view of the rotating mold, showing the formation of the record thereon, Fig. 3, a similar view illustrating the operation of tapering the bore of the record when desired, while still in a plastic condition within the mold, Fig. 4, a similar view illustrating the operation of forming the record on its bore with a series of concentric ribs, Fig. 5, a similar view, showing the reaming of the record, while cold, to taper its bore, Fig. 6, a section on the line 6—6 of Fig. 5, Fig. 7, an end view partly in section, showing convenient apparatus for rotating and cooling the mold, Fig. 8, a longitudinal sectional view of the apparatus used for finishing the bore of the record, while in a more or less plastic state within the mold, the section being taken on the line 8—8 of Fig. 9, Fig. 9, a plan view of the same with the mold and record removed, and Fig. 10, an end view.

In all of these views corresponding parts are represented by the same numerals of reference:

The mold 1 is of tubular form, carrying on its bore the representation in relief of the record to be duplicated and is produced in any suitable and convenient way, preferably by a process of vacuum deposit, as is well known in the art. This mold is provided with a stationary end flange 2, carrying the usual engraved matter for identifying the record, and with a removable end flange 3, adapted to be secured in place in any suitable way. While the record is being formed in the mold, the latter is rotated so as to cause the material to be uniformly distributed over the record surface by reason of the centrifugal force developed. Any suitable mechanism for this purpose may be used, but in Fig. 7, I illustrate a device of the character described in my application filed May 11th, 1906, Serial No. 316,250, above referred to, and comprising a pair of support-

ing rollers 4 4 on which the mold is carried, and a rubber faced driving roller 5 for frictionally engaging and rotating the mold, said driving roller being rotated by a belt 6 and pulleys 7 and 8.

Material may be introduced within the mold in a molten state, the mold being suitably heated so as to prevent the material from congealing thereon, and to permit the material to remain in a perfectly fluid state while it is being distributed over the record surface, as I disclose in my said application, Serial No. 316,250; or instead, the mold need not be heated provided it is very thin and the material is of sufficient bulk, and is heated to a sufficient extent as to bring the temperature of the mold up to or above the melting point of the material, as I disclose in my application Serial No. 317,083; or instead, material may be introduced within a hot mold in the solid state, preferably in powdered or granular condition, which I disclose in my application Serial No. 317,082. In whatever way or condition the material is introduced within the mold, the latter is rotated at the necessary speed to develop sufficient centrifugal force and the material is distributed uniformly over the record surface so as to form a relatively thin layer 10, which during the time of its distribution will be maintained in a fluid condition so as to displace any air or gas bubbles and result in a very perfect impression being taken. This outer or surface layer of the record is now caused to set or harden preferably by rapidly chilling the mold, for instance by a pad 11 carried by a trough 12, to which cooling water is admitted, as I describe in said application, Serial No. 316,250. When the material of the layer 10 has been thus set, and preferably while still slightly plastic and sticky, the material for the inner layer or body 13 of the record is introduced, the mold being still rotated, whereby the material will distribute itself uniformly over and with respect to the surfacing layer 10, and be intimately welded and associated therewith, so as to form practically a continuous structure.

Unless the melting point of the surfacing layer 10 is considerably higher than the melting point of the material comprising the body 13, it will not be practicable to introduce the material for the latter layer in solid form, since it is important that after the surfacing layer has been properly distributed it should retain its solidified condition. Therefore, I introduce a material for the inner layer in the molten state and continue the rotation of the mold until the material has set sufficiently to retain its cylindrical form, the cooling pad 11, or other media being applied to the mold to result in the rapid cooling of the material. If it is desired that the records

should have a cylindrical bore, the operation will be now complete, and as soon as the record has contracted sufficiently to be removed from the mold, the flange 3 is first removed and the record is lifted out. If, however, it is desired that the record should be formed with a tapered bore either smooth or having a series of concentric ribs, a further finishing operation requires to be performed. This finishing of the record may be effected, while the record is still in a more or less plastic state, although sufficiently hard to retain its shape, by means of a mandrel 14, either smooth, as shown in Fig. 3, or provided with a series of grooves 15, to form concentric ribs on the record (Fig. 4). The mandrel 14 is mounted to rotate easily on a stationary stub-shaft 16, maintained at the proper angle to give the desired taper to the bore and carried in a vertically movable slide 17. The slide 17 is mounted in a head 18, and is adapted to be moved vertically by a lever 19. The head 18 slides horizontally on a suitable base 20, being actuated by a lever 21. During the finishing operation, the mold with its more or less plastic contents is carried in a suitable chuck 22, so as to be rotated thereby, and the lever 21 is operated so as to cause the mandrel 14 to enter the mold, after which the lever 19 is moved to depress the mandrel and result in the displacement of the plastic mass, so as to form a bore of the desired taper and shape, the mandrel 14 rotating as the material is displaced, as will be obvious. I find that in this way a tapered bore can be very perfectly formed in a record composed of material which cannot be effectively cut, while in a plastic state and hence while still engaging the mold.

Many materials suitable for the formation of at least the interior of duplicate sound records are so viscid and sticky when in a plastic condition that any attempt to cut them in that state would be impossible. However, by displacing the material as described, by means of a rotatable mandrel, I can effectively finish the bores of records composed of extremely viscid materials. It is preferable that the mandrel 14 should be kept as cold as possible during the finishing operation, and it may, therefore, be chilled before its introduction into the record, or be chilled while within the mold in any suitable way.

In Figs. 5 and 6, I illustrate the finishing of the record on its interior by a cutting operation performed after the record has become cold, and hence after it is freed from the mold. I make use of a chuck 23 of any suitable character, provided preferably with a lining 24 of soft material, such as felt and rubber so as not to scratch the record surface. The record is introduced within the chuck so as to be rotated thereby and a cut-

ting tool 25 engages the bore so as to finish the same on the desired taper. As I have already indicated, the surfacing layer 10 of the record should be composed of a hard and
5 extremely smooth material, so as to resist wear of the reproducer stylus, and eliminate scratching noises as much as possible. This surfacing layer may be made quite thin, so that a relatively expensive material for the
10 same can be effectively used. An example of a suitable composition from which the surfacing layer may be formed is the special transparent composition described in my Patent No. 676,111, dated June 11th, 1901.
15 A suitable example of material from which the inner or body layer may be formed, and which while being extremely cheap is at the same time tough and of approximately the same coefficient of expansion as the material
20 above referred to, is the following: asphalt 80 parts, stearin pitch 20 parts. In the make up of this composition the ingredients are melted and intimately mixed.

25 Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A process of making duplicate sound records, which consists in rotating a mold at a high speed, in introducing a charge of an
30 extremely amorphous material therein to form a surfacing layer, in permitting the surfacing layer to set or harden, in then introducing within the mold a larger charge of a cheap molten material, and in continuing the
35 chilling operation until the composite record as a whole has been set or hardened, substantially as set forth.

2. A process for making duplicate sound records, which consists in rapidly rotating a

mold, in introducing therein a charge of a 40 very amorphous material to form a surfacing layer, in permitting the surfacing layer to set or harden, in introducing within the mold a larger charge of a cheap molten material, in
45 cooling the mold and its contents until the material has set and in finally tapering the bore of the resulting duplicate record, substantially as set forth.

3. A process of making duplicate sound records, which consists in rapidly rotating a 50 mold, in introducing therein a charge of a very amorphous material to form a surfacing layer, in permitting the surfacing layer to set or harden, in introducing within the mold a larger charge of a cheap molten material, 55
in continuing the cooling operation until the material has been set, and in finally displacing the material while in a more or less plastic state to taper the bore thereof, substantially as set forth. 60

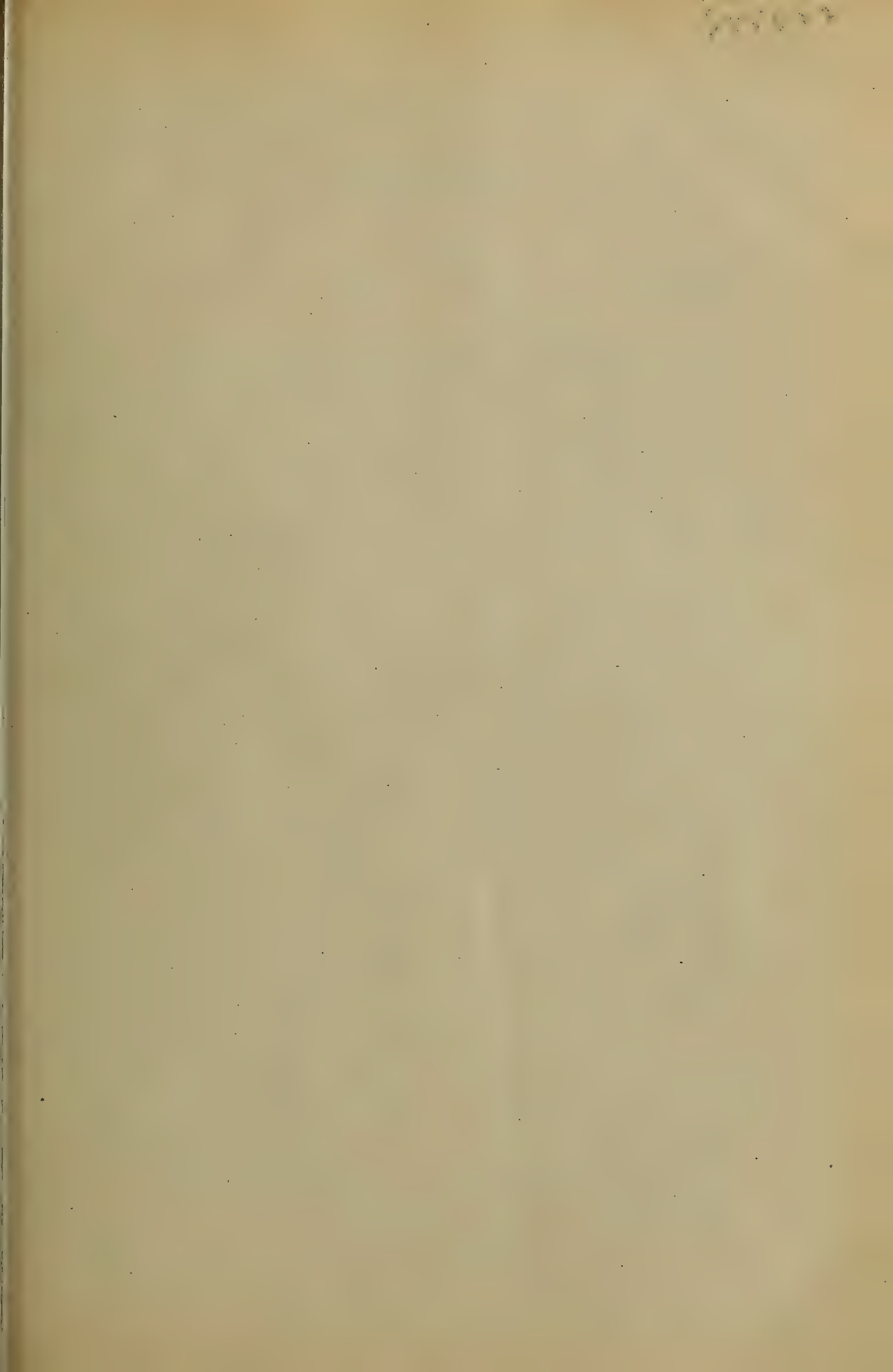
4. A process of making duplicate sound records, which consists in rotating the mold at a high speed, in introducing therein a charge of a very amorphous material to form a surfacing layer, in permitting the surfacing 65 layer to cool and set, in introducing a cheap molten material within the rotating mold before the surfacing layer has been entirely hardened, and in continuing the rotation of the mold until the duplicate record as a whole 70 has been set and hardened, substantially as set forth.

This specification signed and witnessed this 26th day of May, 1906.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.



No. 855,622.

PATENTED JUNE 4, 1907.

N. C. DURAND & E. L. AIKEN.

PHONOGRAPH.

APPLICATION FILED OCT. 26, 1906.

Fig. 3

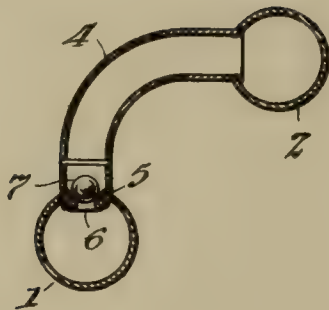


Fig. 4

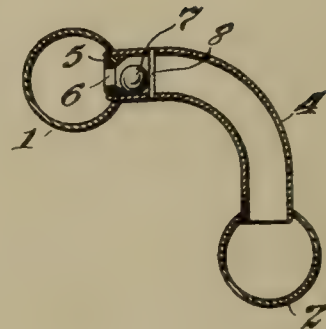


Fig. 1

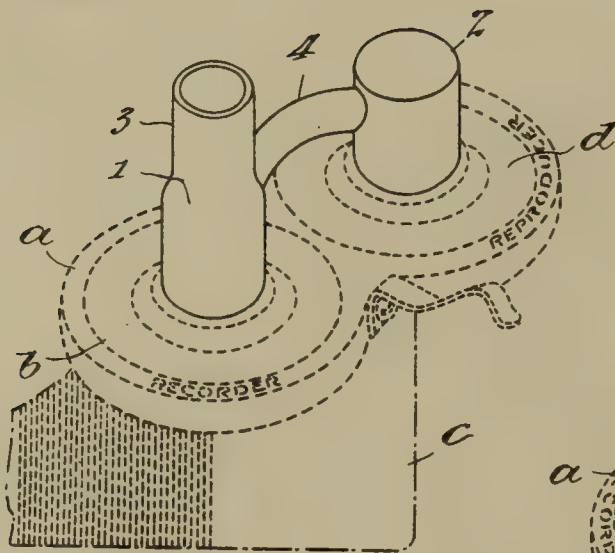
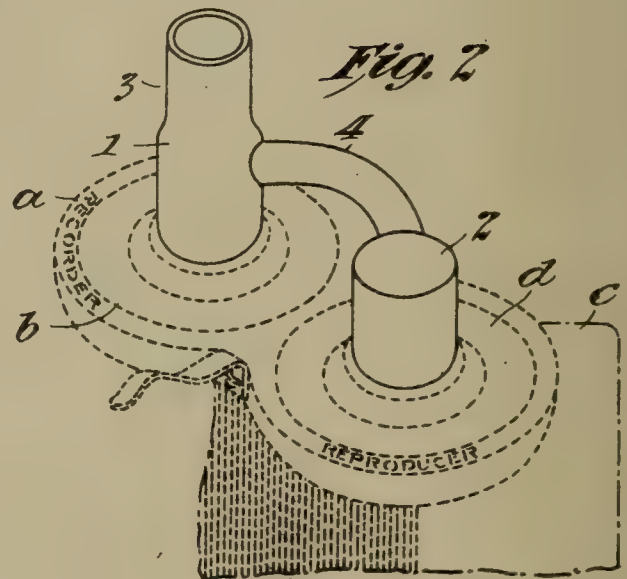


Fig. 2



Witnesses:

Frank D. Lewis

Delos Holden

Inventors:

Nelson C. Durand and
Edward L. Aiken

By Frank L. Sizer *Atty.*

UNITED STATES PATENT OFFICE.

NELSON C. DURAND, OF EAST ORANGE, AND EDWARD L. AIKEN, OF ORANGE, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 855,622.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed October 26, 1906. Serial No. 340,728.

To all whom it may concern:

Be it known that we, NELSON C. DURAND, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, and EDWARD L. AIKEN, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

Our invention relates to phonographs and more particularly to the sound conducting tube or tubes by which the sound waves are conveyed to the diaphragm of the recorder and from the diaphragm of the reproducer, and has been particularly designed for application to phonographs in which the recorder and reproducer are carried in a spectacle frame, as shown for instance in Edison Patent No. 386,974 dated July 31, 1888. In instruments of this character the spectacle frame is capable of assuming two positions, one in which the recorder occupies an operative position with respect to the record surface while the reproducer is in an inactive or inoperative position, and another position in which the reproducer is in an operative position and the recorder is in an inactive position.

It is desirable especially in using phonographs for commercial purposes that one should be able to shift with very little effort from recorder to reproducer and vice versa, so that it should not be necessary to detach the speaking or listening tube from the phonograph in making this change. This result has been accomplished heretofore by means shown in the patent referred to and which comprises a short tube M' carried by a support M which is independent of the pivotal movement of the spectacle frame. The speaking tube is secured to the tube M' and will be in proper position for either recording or reproducing as the movement of the spectacle frame carries the neck of the recorder or reproducer into a position just below the lower end of said tube. The structure described is objectionable, however, in that there will be a slight space or opening between the lower end of the tube M and the neck of the recorder (or reproducer), thus allowing an equalization of pressure and a consequent weakening of the sound waves which

act upon the diaphragm in recording and therefore producing a fainter record than would be produced in case a continuous or unbroken air passage is provided, and furthermore in case the member M which supports the tube M' becomes slightly bent, it becomes impossible to shift the spectacle frame from one position to the other.

Our invention has for its object the provision of a sound conductor or coupling for connecting a single speaking or listening tube with both the recorder and reproducer of a phonograph when carried by a movable spectacle frame as in the patent referred to.

Reference is hereby made to the accompanying drawing of which

Figure 1 is a front elevation showing in full lines a coupling embodying our invention and applied to the recorder and reproducer of a spectacle frame, the latter being shown in dotted lines and being in a position in which the recorder is in operative position with respect to the record surface; Fig. 2 is a view similar to Fig. 1 except that the spectacle frame occupies a position in which the reproducer is operatively situated with respect to the record surface; Fig. 3 is a section of our improved coupling taken on a plane parallel to the plane of the spectacle frame, the parts being in the position shown in Fig. 1; Fig. 4 is a view similar to Fig. 3 of the parts when occupying the position shown in Fig. 2.

In all the views like parts are designated by the same reference numerals.

Referring to Fig. 1 the spectacle frame *a* occupies an oblique position with the recorder *b* directly above and in operative relation to the sound record or blank *c* while the reproducer *d* is in a position above and to one side of the recorder. The coupling comprises a pair of hollow or tubular members 1 and 2, the bore of which is of a size adapted to telescope upon the necks of the recorder and reproducer, making a snug fit. The tube 2 is closed at its upper end while the tube 1 may be extended upwardly forming an open-ended neck 3 as shown, upon which the ordinary speaking or listening tube may be applied by making the same of a size adapted to snugly fit over the said neck 3 which is preferably of the same outside diameter as the neck of the recorder or reproducer. The tubes 1 and 2 are connected by a curved tube

4: within this tube is a valve seat 5 formed with a port 6 adapted to be closed by a ball 7 when the parts are in the position shown in Figs. 1 and 3.

5 When the spectacle frame is turned into the position of Figs. 2 and 4 the reproducer will then be in suitable position for tracking the record while the recorder will be situated above and to one side of the same. In this position the ball 7 rolls off from the valve
10 seat 5 thus opening the port 6, and a pin 8 placed across the bore of the tube 4 prevents the escape of the ball 7.

The operation of the device is as follows:

15 When the recorder is in operative position the port 6 is closed by the ball 7, therefore the sound waves which enter the coupling through the neck 3 pass into the air chamber of the recorder without being weakened as
20 would be the case were the port 6 open, and when the parts are in position for reproducing, the port 6 is open and the waves or vibrations set up in the air chamber of the reproducer find an unobstructed passage to
25 the neck 3 and the listening tube. The port 6 is automatically opened and closed as the spectacle frame is shifted from one position to the other. Furthermore since the listening tube is applied to the neck 3 which is di-
30 rectly above the recorder, the device acts as an indicator of the position of the recorder. The user will not be likely to attempt to dictate to the phonograph when the parts are in the position of Fig. 2 because the speaking
35 tube will lead to a point considerably above and in rear of that portion of the record surface which should be acted upon so that it will be evident to the user that he is talking to the wrong spot, whereas with the parts in
40 the position of Fig. 1 the speaking tube will lead to a point directly above and close to the record surface, thus showing the user that the sound waves are being conducted to the proper spot. It will be obvious however,
45 that the point of application of the speaking tube need not necessarily be an extension of the tube 1, as the valve seat 5 may be situated anywhere between the reproducer and recorder and the speaking tube applied any-
50 where between the recorder and valve seat the only point to be observed being that the valve be so designed as to be open when the parts are in the position of Fig. 2 and closed when in the position of Fig. 1.

55 Having now described our invention, what we claim as new and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination of a frame, a recorder and reproducer carried
60 thereby, and a coupling comprising a pair of

hollow members communicating with the interiors of said recorder and reproducer and with each other, substantially as set forth.

2. In a phonograph, the combination of a frame, a recorder and reproducer carried
65 thereby, and a coupling comprising a pair of hollow members communicating with the interiors of said recorder and reproducer, and with each other through a valved connection, substantially as set forth. 70

3. In a phonograph, the combination of a frame, a recorder and reproducer carried
75 thereby, and a coupling comprising a pair of hollow members communicating with the interiors of said recorder and reproducer, and with each other through a connection having a ball valve, substantially as set forth.

4. In a phonograph, the combination of a frame, a recorder and reproducer carried
80 thereby, and a coupling comprising a pair of tubular members applied to the necks of said recorder and reproducer and connected to each other by a curved tube having a ball valve, substantially as set forth.

5. As a new article of manufacture, a
85 coupling comprising a pair of tubular members, a connection and a ball valve adapted to close said connection, substantially as set forth.

6. As a new article of manufacture, a
90 coupling comprising a pair of tubular members connected by a tube, one of said members being provided with an open ended extension, substantially as set forth.

7. As a new article of manufacture, a
95 coupling comprising a pair of tubular members connected by a valved tube, one of said members being provided with an open ended extension, substantially as set forth.

8. As a new article of manufacture, a
100 coupling comprising a pair of tubular members connected by a tube having a ball valve, one of said members being provided with an open ended extension, substantially as set forth. 10

9. As a new article of manufacture, a coupling comprising a pair of tubular members adapted to fit upon the necks of a recorder and reproducer, a tube connecting said members and a valve in said tube, one of said members being provided with an open ended extension of slightly reduced diameter, substantially as set forth. 110

This specification signed and witnessed this 24th day of October, 1906.

NELSON C. DURAND.
EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

055011

No. 855,674.

PATENTED JUNE 4, 1907.

H. SHEBLE.
TALKING MACHINE.
APPLICATION FILED MAR. 14, 1907.

Fig. 1.

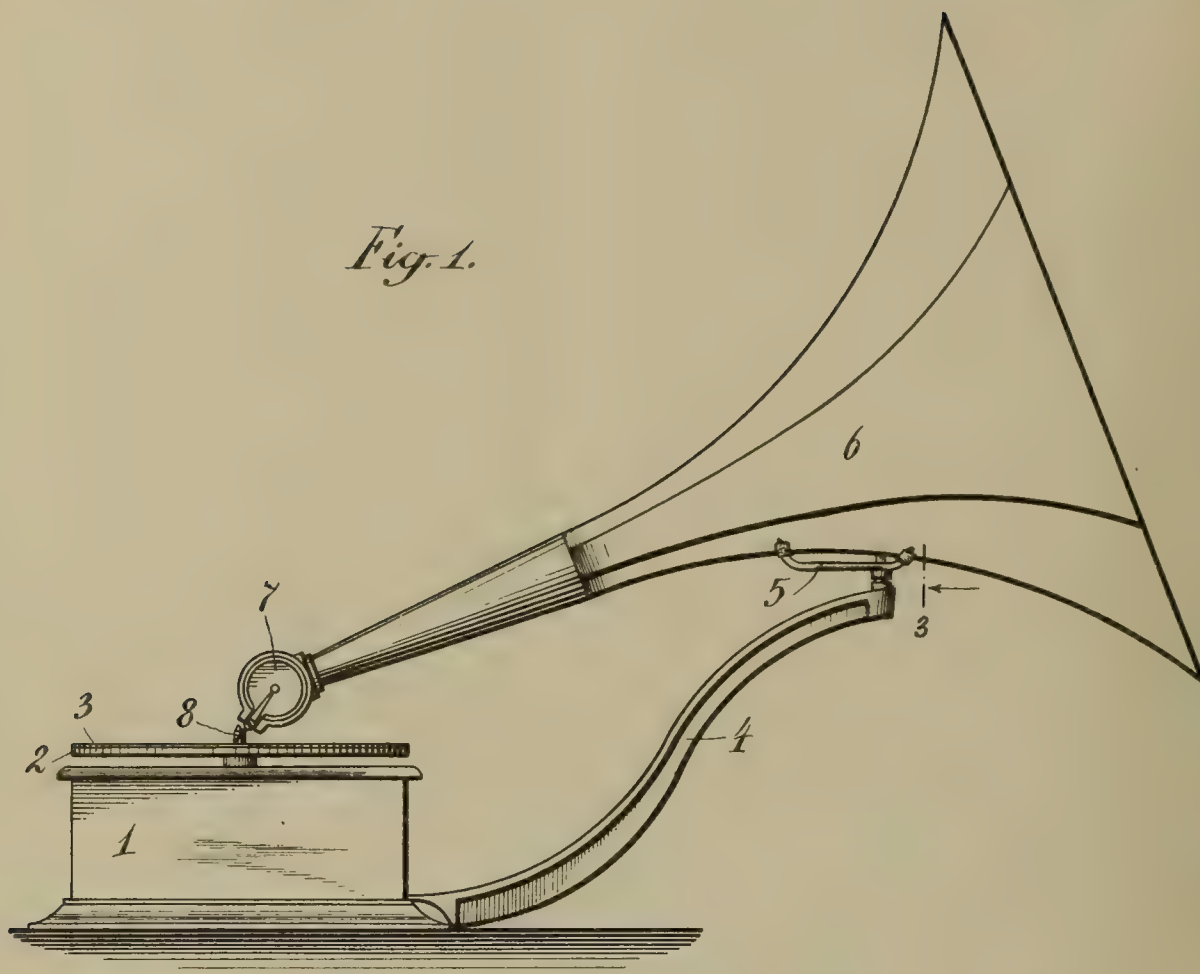


Fig. 2.

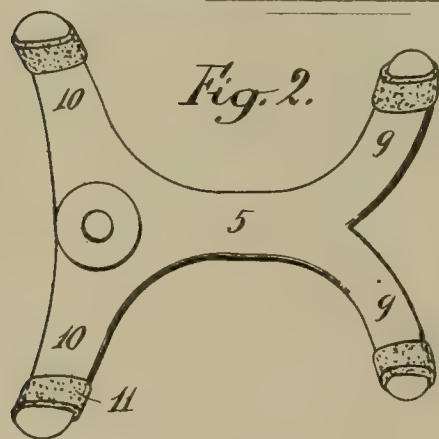
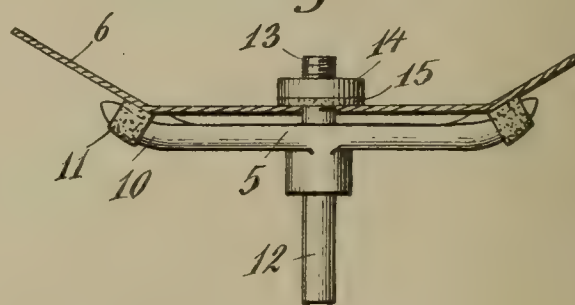


Fig. 3.



WITNESSES:

H. Edwards.
Louis E. Smorack.

INVENTOR

Horace Sheble

BY

H. Edwards.

ATTORNEY

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADEL-
PHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 855,674.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed March 14, 1907. Serial No. 362,297.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking-machines and has reference more particularly to the devices for supporting the sound-conveying horns of such machines.

The object of the invention is to effect certain improvements in the construction of talking-machines with respect particularly to the horn-supporting devices, to the end that an apparatus is provided in which the horn is held securely against displacement and in which the horn-supporting devices are of comparatively small size, so as not to detract from the appearance of the machine.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is an elevation of a talking-machine constructed in accordance with my invention; Fig. 2 is a plan view of the horn-supporting cradle; and Fig. 3 is a section on the line 3—3 of Fig. 1.

Referring to these drawings, 1 indicates the motor-box, having therein a suitable motor arranged to drive a vertical shaft which extends through the top of the box and carries a rotatable turn-table 2. The sound-record 3, in this case a disk having a laterally undulating groove of substantially uniform depth cut in one face thereof, is adapted to be rested upon and rotated by the turn-table 2. Secured to the box 1 and extending outwardly therefrom, is an arm 4, on the outer end of which is pivotally mounted a cradle 5, which carries the tapering sound-conveying horn 6. Secured to the small end of this horn is a sound-box 7 having a stylus 8, the end of the stylus tracking in the record-groove in the sound-record 3.

The cradle 5 consists of a casting having a plurality of outwardly extending arms. Preferably the cradle has four such arms, the two arms 9, 9, at one end thereof being somewhat shorter than the two arms 10, 10, at the opposite end. On the end of each of these arms is a sleeve 11 of rubber or other cushion-

ing material. The cradle 5 is pivotally mounted upon the end of arm 4, this being preferably done by providing a vertical opening through the end of arm 4 and a pin 12 on the cradle 5 which is received in this opening. This pin may be formed integral with the cradle or it may be secured in an opening formed therein. The latter construction is preferred, the pin being extended upward beyond the upper surface of the cradle and utilized to secure the horn upon the cradle. The upwardly extending portion of the pin is indicated at 13, Fig. 3, and extends through an opening in the bottom of the horn 6. This end 13 of the pin is threaded and a hand-nut 14 is screwed thereon to hold the horn 6 upon the cradle 5, a washer 15 being preferably inserted between nut 14 and the wall of the horn.

It will be seen that the arms 9, 9, and 10, 10, of the cradle are comparatively short and extend around but a very small portion of the horn. Movement of the horn upon the cradle or its displacement therefrom is, however, effectually prevented, as the end 13 of the pin and the nut 14 serve to hold the horn securely upon the arms of the cradle. Any foreign noises, due to jarring of the horn upon its support, are prevented by the rubber sleeves 11. Furthermore, this form of cradle can be produced at very low manufacturing cost.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. In a talking-machine, the combination of a motor-box, an arm secured to and extending outwardly from the box, a cradle pivotally mounted upon the outer end of the arm, said cradle having a plurality of outwardly-extending supporting arms, a tapering horn directly overlying said cradle and resting upon the arms thereof said arms extending but a short distance to either side of a vertical plane through the axis of the horn, and means for securing the horn to the cradle, substantially as set forth.

2. In a talking-machine, the combination of a motor-box, a rotatable turn-table mounted thereon, an arm secured to and extending outwardly from the box, a cradle pivotally mounted upon the outer end of the arm having a plurality of integral outwardly-extend-

ing supporting arms, a tapering horn directly overlying the cradle and resting upon the arms thereof, said arms extending but a short distance to either side of a vertical plane through the axis of the horn, a sound-box secured to the smaller end of the horn, its stylus adapted to track in the groove of a sound-record supported on said turn-table, and means for securing said horn upon said cradle, substantially as set forth.

3. In a talking-machine, the combination of a motor-box, an arm secured to and extending outwardly from the box, a cradle pivotally mounted upon the outer end of the arm, said cradle having a plurality of outwardly-extending supporting arms and an upwardly-extending pin, a tapering horn resting upon said arms and having an opening therein through which said pin on the cradle extends, and means coacting with said pin to secure the horn upon the cradle, substantially as set forth.

4. In a talking-machine, the combination of a motor-box, an arm secured to and extending outwardly from the box, said arm having an opening through the outer end thereof, a cradle having a plurality of outwardly-extending arms, a downwardly-ex-

tending pin received in said opening, and an upwardly-extending pin, a tapering horn having an opening therein through which said upwardly-extending pin extends, and a nut upon said upwardly-extending pin securing the horn upon the cradle, substantially as set forth.

5. In a talking-machine, the combination of a motor-box, an arm secured to and extending outwardly from the box, said arm having an opening through the outer end thereof, a cradle having a pair of outwardly-extending arms at one end thereof and a pair of longer, outwardly-extending arms at the other end thereof, a pin extending through the cradle adjacent to said longer arms, the lower end of the pin being received in said opening, a tapering horn having an opening therein through which the upper end of said pin extends and a nut on said upper end securing the horn upon the arms of the cradle, substantially as set forth.

This specification signed and witnessed this 8th day of March, 1907.

HORACE SHEBLE.

Witnesses:

A. C. WRIGHT,
F. A. DE LANO.

8-55736

L. P. VALIQUET.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 12, 1904.

Fig 1.

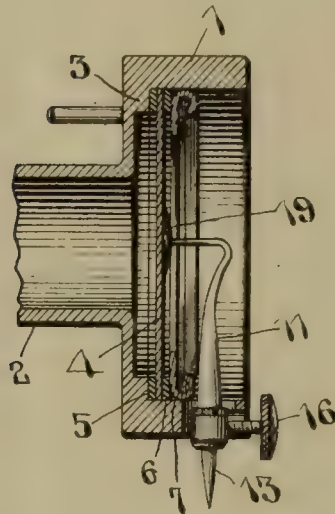


Fig 2.

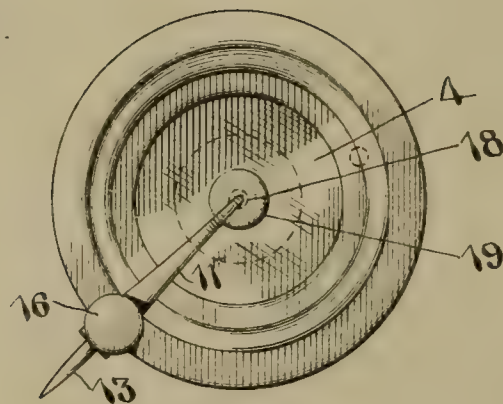


Fig 3.

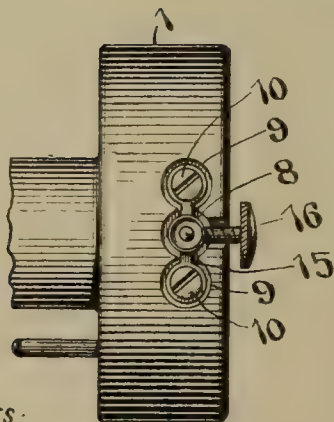
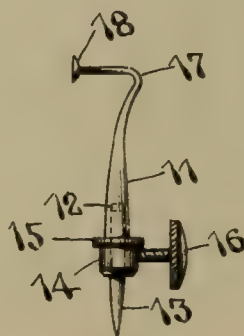


Fig 4.



WITNESSES:

F. J. Hartman.

Edw. W. Vaill Jr

INVENTOR

Louis P. Valiquet.

BY

Wm. L. Peters.
ATTORNEY.

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO THE VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW YORK.

SOUND-BOX FOR TALKING-MACHINES.

No. 855,736.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed January 12, 1904. Serial No. 188,805.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States, and a resident of the city of New York, State of New York, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide such a construction in sound boxes that the stylus bar may be adjusted and formed so as to have the correct characteristics of elasticity, shape and size in relation to the diaphragm.

A further object of my invention is to provide such a stylus bar that the tendency to lateral movement of its end where it connects with the diaphragm is entirely obviated and the sound waves thereby discharge at in more exactly perpendicular direction upon the diaphragm of the sound box.

Briefly, my invention consists in providing a stylus bar, the end of which is bent inwardly to form the connection between the end of the stylus bar and the diaphragm, the parts being integral and capable of being filed or reduced so as to vary their size, shape and elasticity.

For a full, clear and exact description of my invention reference may be had to the accompanying specification and to the accompanying drawing forming part thereof, in which

Figure 1 is a vertical sectional view of a sound box, said section being taken substantially on a plane passing through the axis of the stylus bar; Fig. 2, a front elevation of the sound box; Fig. 3, a side view of the sound box on the side thereof through which the stylus bar projects, and Fig. 4, an elevation of the stylus bar detached from the sound box.

Referring to the drawing, the numeral 1 indicates the cylindrical casing of the sound box, and 2 the sound tube thereof. The interior of the casing is formed with the usual flange or seat 3 for holding the diaphragm 4 in position. The usual gaskets or other suitable material are placed each side of the diaphragm as indicated at 5 and 6. A ring 7 preferably of metal and slightly elastic is forced against the outer gasket 6 to hold the diaphragm in position. An opening 8 is provided in the cylindrical portion of the casing

1, and located adjacent thereto are recesses 9 which are adapted to receive the heads of the screws 10 for holding the fulcrum and stylus bar in position.

The stylus bar 11 consists of a tapering piece of steel or other suitable material having the usual recess 12 in its lower end for receiving the stylus or needle 13. The lower end of the said stylus bar 11 is provided with an enlarged portion in the nature of a flange against which the supporting spring yoke or fulcrum 15 is seated and through which passes the thumb-screw 16 for retaining the needle 13 within the end of the stylus bar. The inner reduced end of the stylus bar 11 is curved slightly outward and then inward at right angles to the axis of said stylus bar as indicated at 17. The inner end of the right angled portion is provided with enlarged head 18 which is secured against the diaphragm 4 by means of wax or other suitable material, as indicated at 19. The curved portion 17 of the stylus bar 11 is preferably of small radius and of the shape shown in Figs. 1 and 4, the shape shown being that most convenient for the adjustment and treatment of the stylus bar for balancing the same in relation to diaphragms of different peculiarities and characteristics.

It is well known in the manufacture of sound boxes that the mica usually employed for diaphragms comes in slightly different thicknesses which materially affects the quality and volume of the sound produced. A thick diaphragm would of course require a stylus bar of less elasticity, of more rigidity, and of heavier weight than would a diaphragm of a less thickness. It is therefore necessary to balance the stylus bar to correspond to the thickness of a particular diaphragm. This balancing may be easily accomplished in the present form of my invention by scraping or filing away the material about the curve and the portions adjacent thereto, of the stylus bar. This not only reduces the weight of the stylus bar at the point of the curve but also varies its elasticity and rigidity so that the said characteristics may be exactly and accurately produced to correspond with the diaphragm which has been inserted. In addition to the advantages of having the inner end of the stylus bar reduced and curved as described, the stylus bar is made resilient for a portion

of its length which allows the vibrations caused by the undulations of the groove of the sound record to be modified during their transmission to the diaphragm. This causes the sound produced by the diaphragm to be much softened and the harsh and undesirable vibrations are, therefore, eliminated.

The curve 17, in combination with the outward bend of the stylus bar proper, affords a much longer connection between the stylus bar and the diaphragm, thereby obviating the tendency of the diaphragm to be moved transversely, owing to the fact that the end of the stylus bar vibrates or oscillates in the arc of a circle. This longer connection also allows the part at right angles to the diaphragm to be made stiffer without sacrificing any features of the resiliency thereof.

By having the fulcrum spring or yoke located as shown in the drawings, that is, substantially in the plan of the axis of the stylus bar and by providing the inner end of the stylus bar with the shape shown, the oscillations of the stylus bar are made at almost exactly right angles to the plane of the diaphragm. This does away with any tendency of the end of the stylus bar to move laterally in the plane of the diaphragm, which in some instances with heavy vibrations is sufficient to loosen the connecting portion of the stylus bar from the diaphragm.

I do not wish to be limited to the exact details of form and arrangement of parts herein set forth for the same may be varied, to produce the functions and results set forth, in a degree commensurate with the claims hereinafter made.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. In a sound box for talking machines, the combination of a diaphragm and a stylus bar having a double or reversed curve and having its inner end brought into operative relation with said diaphragm.

2. In a sound box for talking machines, the combination with a diaphragm, of a stylus bar gradually tapered toward its inner end, and having a double or reversed curve, said inner end being adapted to be connected to the diaphragm.

3. In a sound box for talking machines, a stylus bar which is gradually tapered toward its inner end, said end being curved outwardly on an arc of comparatively large radius and then curved inwardly on an arc of comparatively small radius to connect with the diaphragm on a line at substantially right angles to the plane thereof.

4. In a sound box for talking machines, the combination of a diaphragm and a stylus bar which is reduced in diameter toward its inner end, said reduced portion being bent out of the direct line first away from and then toward the point where it is connected

with the diaphragm to increase its length in relation to the length of the radius of the sound box.

5. In a sound box for talking machines, a stylus bar having a reduced inner end, said end being curved outwardly, and then inwardly to be attached to said diaphragm and to form a resilient or yielding connection therefor.

6. In a sound box for talking machines, a stylus bar having a gradually reduced inner end which is adapted to be attached to the diaphragm, said end being curved outwardly, and then inwardly in a direction substantially at right angles to the axis of the stylus bar to form a resilient connection.

7. In a sound box for talking machines, a stylus bar having a tapering inner end, said inner end being bent outwardly, and then inwardly in a curve of small radius to connect with the diaphragm to form a resilient connection therewith.

8. In a sound box for talking machines, a stylus bar which is tapered toward its inner end, said end being bent outwardly and then curved inwardly to connect with the diaphragm and to form a resilient connection therewith.

9. In a sound box for talking machines, a stylus bar having an integral flange thereon, a fulcrum for said stylus bar comprising a torsion spring having a central collar held frictionally in position against the said flange on the stylus bar, said spring having annular ends adapted to be attached to the sound box casing.

10. In a sound box for talking machines, a stylus bar having an integral flange, a fulcrum for said stylus bar comprising a torsion spring having portions substantially in the plane of the axis of said stylus bar having a central collar adapted to be held frictionally in position against the flange on the stylus bar and having annular ends adapted to be attached to the sound box casing.

11. In a sound box, the combination with a diaphragm and a support for a stylus bar, of a stylus bar having a double or reversed curve between its support and its point of connection with said diaphragm.

12. In a sound box, the combination with a diaphragm of a stylus bar having a double curve which extends first away from and then toward said diaphragm, the inner end of said stylus bar being adjacent said diaphragm.

13. In a sound box for talking machines the combination of a diaphragm and a stylus bar, said stylus bar having its inner end inclined outwardly away from the diaphragm, and then turned inwardly to be attached to said diaphragm, to form a resilient or yielding connection therefor.

14. In a sound box, a stylus bar having its inner extremity bent outwardly on a curve

of relatively large radius and bent inwardly
on a curve of relatively small radius.

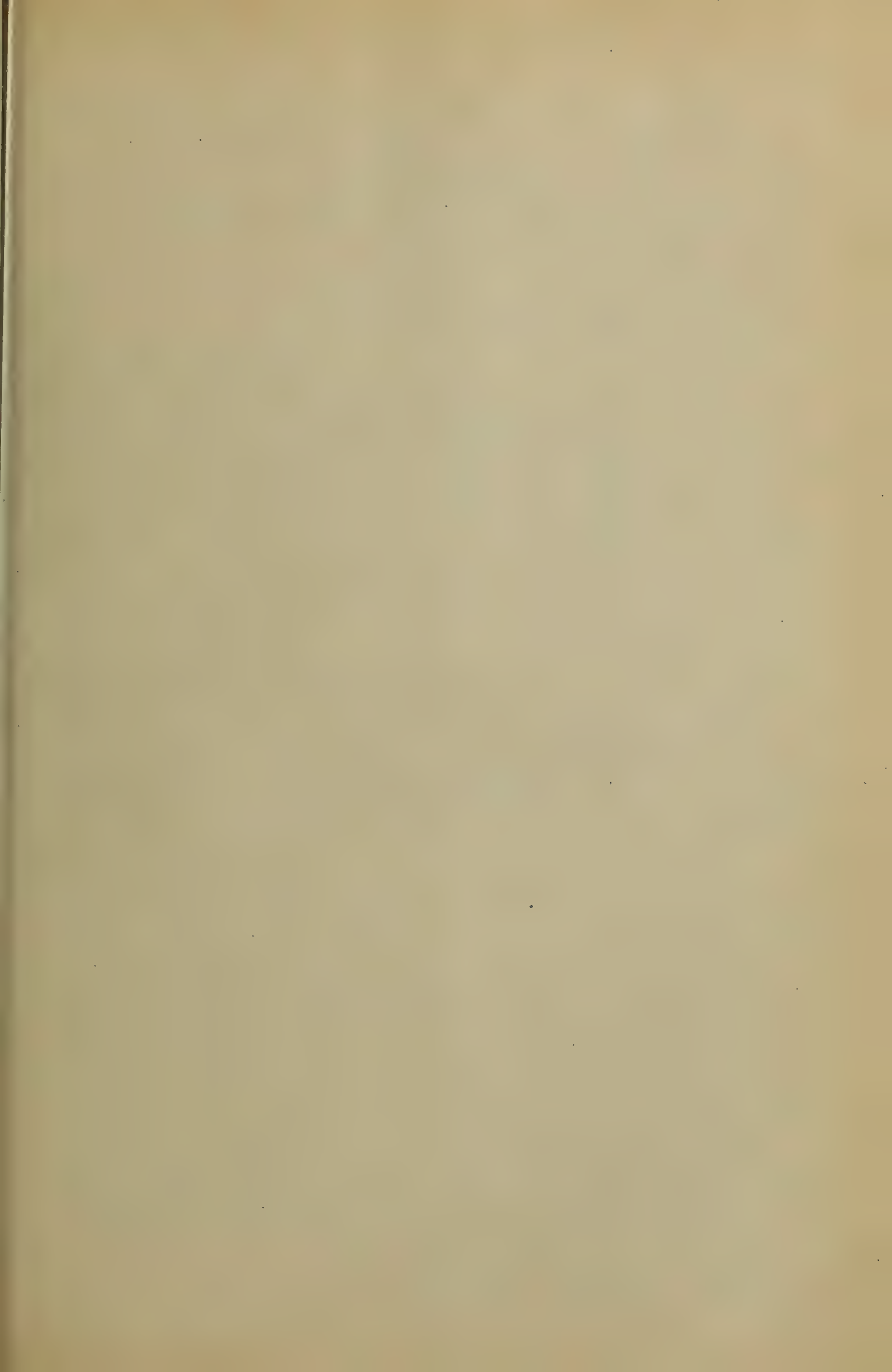
15. In a sound box, a stylus bar tapered
toward its inner extremity, the said stylus
5 bar being bent outwardly on a curve of rela-
tively large radius and being bent inwardly
on a curve of relatively small radius.

In witness whereof I have hereunto set my
hand this 8th day of January, A. D. 1904.

LOUIS P. VALIQUET.

Witnesses:

FRANK G. SWARTWOUT,
JOSEPH M. ZAREMBA.



No. 855,761.

PATENTED JUNE 4, 1907.

J. H. ELFERING.
TALKING MACHINE.

APPLICATION FILED SEPT. 1, 1903.

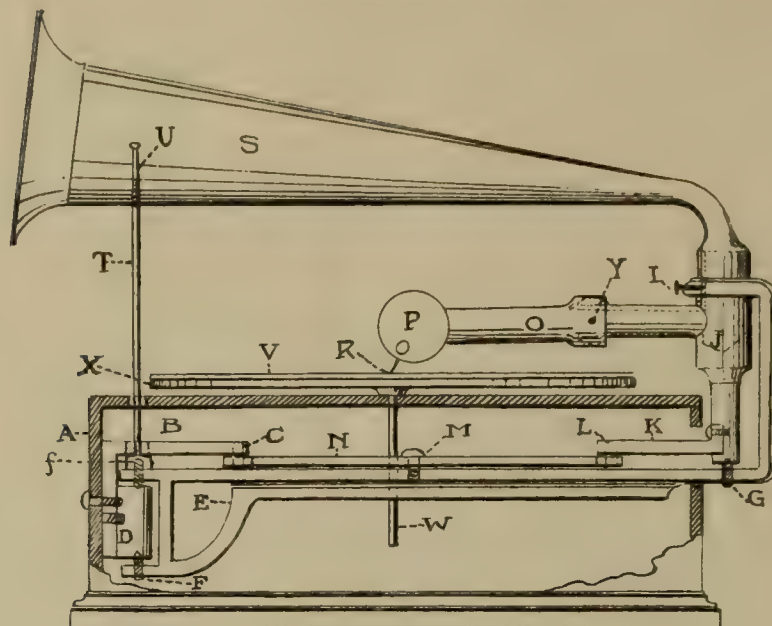


FIG. 1.

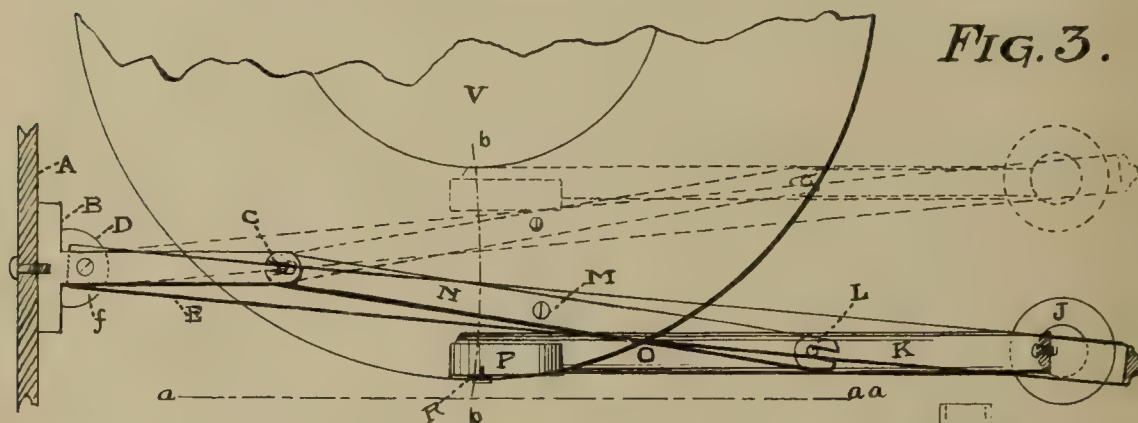


FIG. 3.

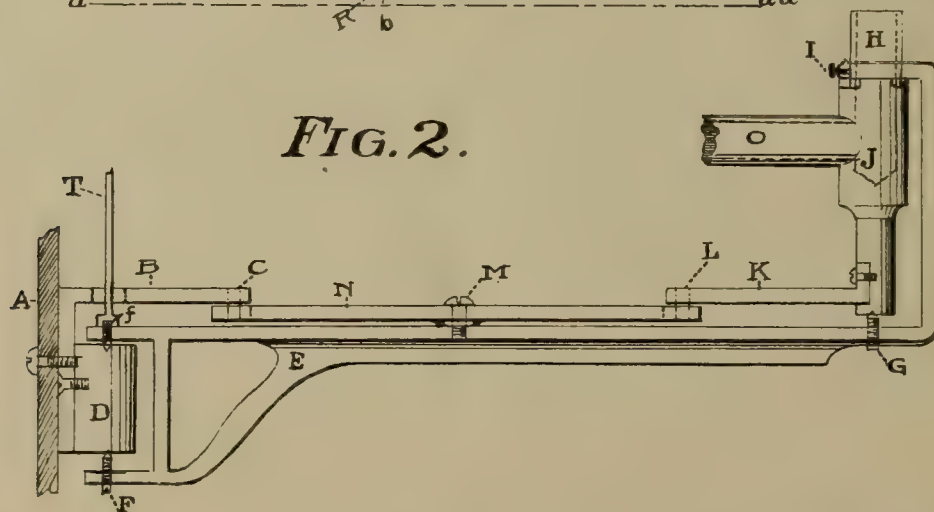


FIG. 2.

WITNESSES

L. Louis Phelps.
H. A. Wythes

INVENTOR

John H. Elfering
By *Horace Pettit*
Attorney

UNITED STATES PATENT OFFICE.

JOHN H. ELFERING, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

No. 855,761.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed September 1, 1903. Serial No. 171,485.

To all whom it may concern:

Be it known that I, JOHN H. ELFERING, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My improvement is applicable especially to disk talking machines, and the object of my invention is to provide means for presenting the reproducing sound box to the record in the most advantageous position for the production of sound, and the preservation of the record and needle. The manner in which I attain these objects is illustrated in the accompanying drawings, in which:—

Figure 1 is a side view of the mechanism attached to a machine. Fig. 2 a side view of the same separate from the machine, and, Fig. 3, a plan showing the movement accomplished by the mechanism.

Similar letters refer to similar parts in the several views.

To the cabinet A is secured the angle piece B, the projecting part of which is adapted to hold the downwardly extending pin C. To the angle piece B is secured the block D. The arm E is fitted with two pointed screws F and f, and is thereby pivoted upon the block D. Near the other end of the arm E another pointed screw G is located. The upwardly extending part of the arm E, is provided with a ring E' which is fitted with the tube H, held in place by the set screw I. Resting upon the pointed screw G, and having the upper end pivotally supported in place by the tube H, is the hub J. To the hub J is secured the arm K, to the projecting end of which is secured the downwardly extending pin L. Pivoted to the central portion of the arm E by the screw M is the lever N, slotted at each end, to loosely engage the pins C. and L.

Attached to the hub J is the tube O, supporting at its end the sound box P, the needle point being shown at R. The tube O is in two parts, the extending part being pivoted upon the part attached to the hub J by the pin Y. The tube H is also adapted to serve as the support for the small end of the amplifying horn S. A further support for the horn S is the rod T, screwed to the arm E above its pivoted center by means of the

screw f, and fitted with a bent wire U upon which the horn rests. A spindle W is shown supporting the turn table, upon which is placed the record V.

The operation of the devices described is as follows:—The tube O, pivoted at Y, allows the needle R to rest upon and in the spiral groove of the record V. The record being revolved by the motor of the machine, the needle point is continually being moved toward the center of the record a distance equal to one groove for each revolution. This movement of the needle turns the attached hub J upon the pivots, screw G and tube H, and causes the pin L, in the attached arm K to engage with the slotted arm N, moving the end engaged with the pin L in the same direction as the arm K tube O and sound box needle R. The other end of lever N engages with the pin C, and is held at its fixed point but for the slight end movement the slot compensates for. There is therefore a relative movement established by the lever N between the arm E and arm O, so that the arm O and attached sound box P maintain a position parallel with the line a—aa throughout the course of movement; the needle at the same time moving in the arc of a circle b—b, of which the distance from the pivot screw f to the pivot screw G is the radius. The spiral grooves in the record V being approximately tangent to the line a—aa at the point of contact with the needle, the sound box is held tangent to them and the needle in a fixed relative position throughout the movement.

The amplifying horn S incases at one end the tube H for the reception of the sound, and is supported by the rod T above the center of the pivot screws F, f, to minimize the tendency to prevent the easy movement of the mechanism. A passage for the sound into the horn S is provided by the chamber of the tube O, hollow hub J and tube H.

Types of talking machines employing the sound box P attached to the tube O, pivoted upon the pin Y fixed in the part of the tube O attached to a hub similar to hub J, pivoted between pivot screw G and tube H, the screw G and tube H being attached to an arm rigidly held by the cabinet, thereby allowing the needle R to move in a circular path, of which the pivot G would be the center, have been made. I do not claim these devices

as new. I select this form of machine as being one to which my improvements are applicable. Modified to suit conditions, they are also applicable to other types.

5 What I do claim as new, and desire to secure by Letters Patent is:

1. In a talking machine, the combination of a sound box carrying arm, a sound box, means for guiding the stylus in an arc across the record surface and means for maintaining the stylus substantially tangent with the record groove.

2. In a talking machine, the combination with a sound box carrying arm mounted on a pivot the axis of which is perpendicular to the plane of the record and sound box, of means for keeping the stylus of the reproducer substantially tangent with the record groove as the said sound box moves across the record.

3. In a talking machine, the combination with a sound box, of a swinging sound box arm mounted on a pivot the axis of which is perpendicular to the plane of the record, to which said sound box is attached, and means for moving said sound box so as to keep the plane of the stylus substantially tangent to the record groove as the sound box moves across the record.

4. In a talking machine, the combination with a sound box, of a swinging sound box arm mounted on a pivot the axis of which is perpendicular to the plane of the record, to which said sound box is fixed, and means for moving said sound box and carrying arm so as to keep the plane of the sound box stylus substantially tangent to the record groove as the sound box moves across the record.

5. In a talking machine, the combination with a sound box, of a hollow swinging sound box carrying arm mounted on a pivot the axis of which is perpendicular to the plane of the record, communicating with the interior of said sound box and to which said sound box is fixed, and means for moving said sound box and carrying arm so as to keep the plane of the stylus of the sound box substantially tangent to the record groove as the reproducer moves across the record.

6. In a talking machine, the combination of a pivoted arm, a sound box carrying arm pivotally mounted on said first named arm and means connecting the pivot of the sound box arm with a fixed point for keeping the axis of said sound box arm substantially tangent to the record groove as the sound box moves across the record.

7. In a talking machine, the combination of a pivoted supporting arm, a sound box arm pivotally mounted on said arm and means carried by said supporting arm and connecting the pivot of the sound box arm to the pivoted supporting arm for keeping the axis of said sound box arm substantially

tangent to the record groove as the sound box moves across the record.

8. In a talking machine, the combination of a pivoted supporting arm, a sound box arm pivotally mounted on said supporting arm, a lever carried by said supporting arm and connection between said lever and the pivot of said supporting arm and a fixed point for keeping the axis of said sound box arm substantially tangent to the record groove as the sound box moves across the record.

9. In a talking machine, the combination of a pivoted supporting arm, a sound box arm pivotally mounted on said supporting arm, a projection connected with said sound box arm, a fixed projection and a lever carried by said supporting arm and connecting said projections for keeping the axis of said supporting arm substantially tangent to the record groove as the sound box moves across the record.

10. In a talking machine, the combination of a hollow sound box arm, a hub with which said hollow arm connects, a pivoted arm upon one end of which said hub is mounted and means connecting said hub and a fixed point for keeping the axis of said hollow arm substantially tangent to the record groove as the sound box moves across the record.

11. In a talking machine, the combination of a hollow sound box arm, a hub communicating with one end thereof, a pivoted arm adjacent the end of which said hub is pivotally mounted, a projection fixed to said hub and a lever connecting said projection with a fixed point for keeping the axis of said hollow arm substantially tangent to the record groove as the sound box moves across the record.

12. In a talking machine, an arm mounted to swing across the record and carrying a sound box on its swinging end in combination with means to maintain the stylus of said sound box in a plane tangent to the groove of the record.

13. In a talking machine, a sound conveying arm mounted to swing across the record and carrying a sound box on its swinging end in combination with means for maintaining the stylus in a plane tangent to the groove of the record.

14. In a talking machine, an arm mounted to swing across the surface of the record and carrying a sound box on its swinging end in combination with means for maintaining the engaging extremity of the reproducing needle in a plane tangent to the groove of the record.

15. A talking machine, comprising a vertically and laterally swinging sound conveying arm carrying a sound box on its swinging end in combination with means for maintaining the engaging extremity of the

stylus needle tangent to the groove of the record.

16. In a talking machine, the combination with a reproducer and pivoted reproducer arm swinging in a plane parallel to the face of the record, of means for keeping the stylus of said reproducer substantially tangent with the record groove as the said reproducer moves across the record.

17. In a talking machine, the combination with a reproducer, of a swinging reproducer arm to which said reproducer is pivoted, and

means for moving said reproducer about its pivot so as to keep the plane of its stylus substantially tangent to the record groove as the reproducer moves across the record.

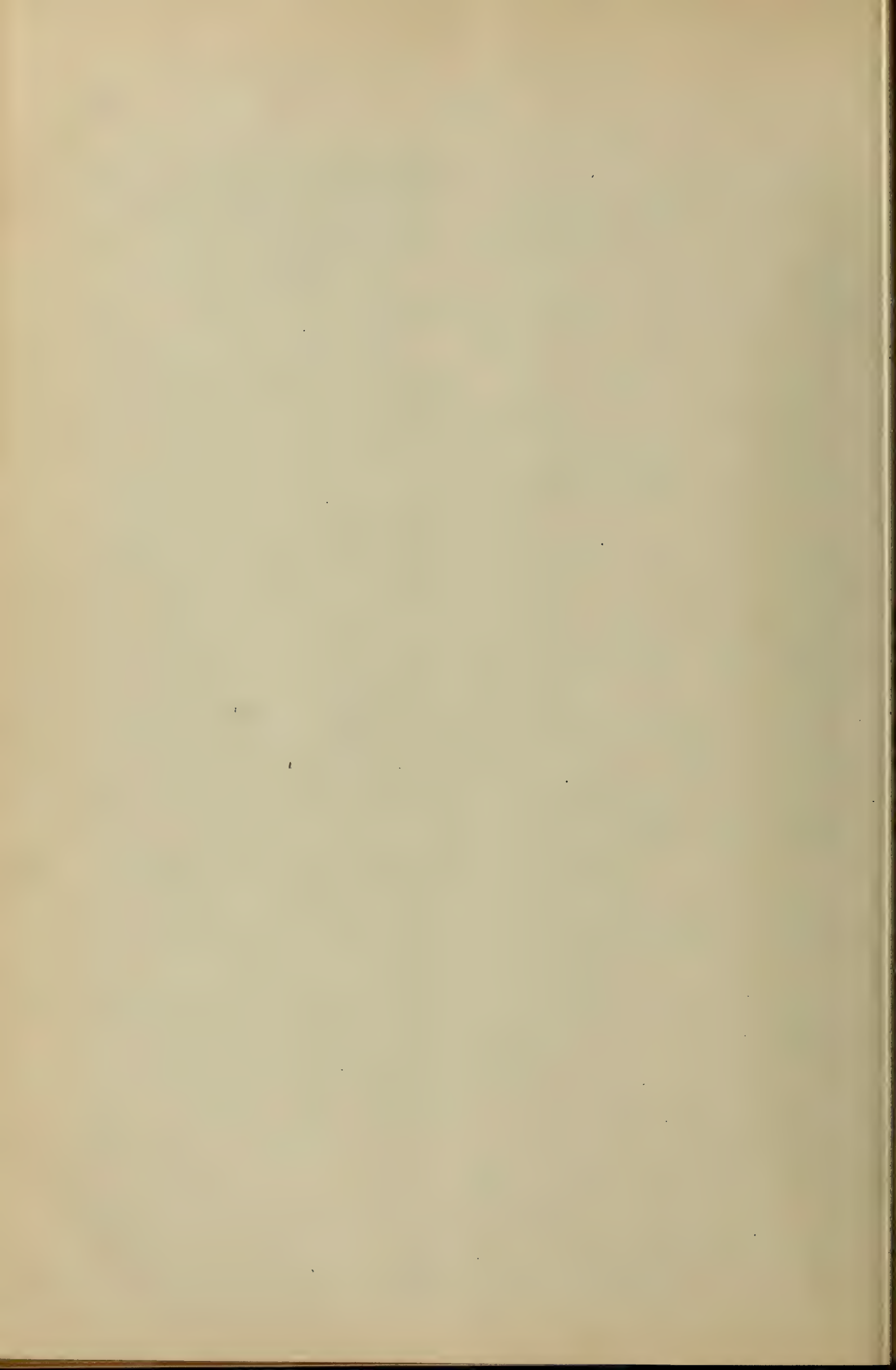
In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN H. ELFERING.

Witnesses:

HORACE PETTIT,

LEWIS H. VAN DUSEN.



No. 855,828.

PATENTED JUNE 4, 1907.

E. L. AIKEN.

PHONOGRAPH RECORDER AND REPRODUCER.

APPLICATION FILED FEB. 5, 1906.

Fig. 1

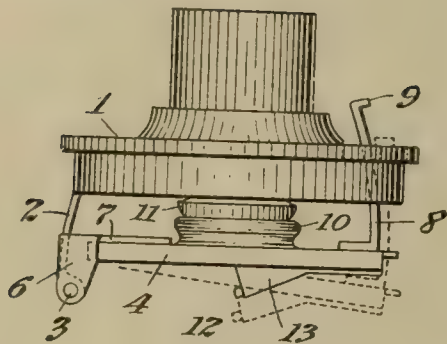


Fig. 3

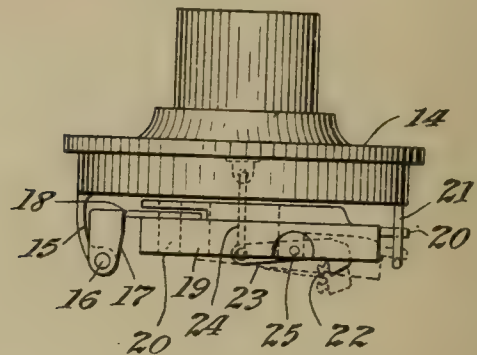


Fig. 2

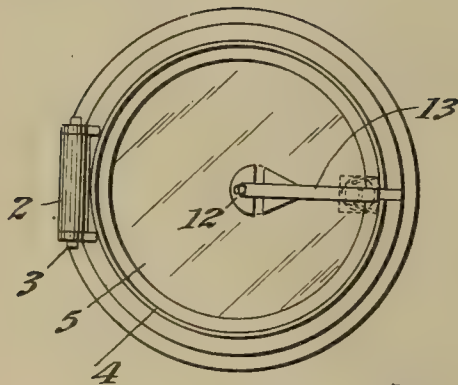


Fig. 4

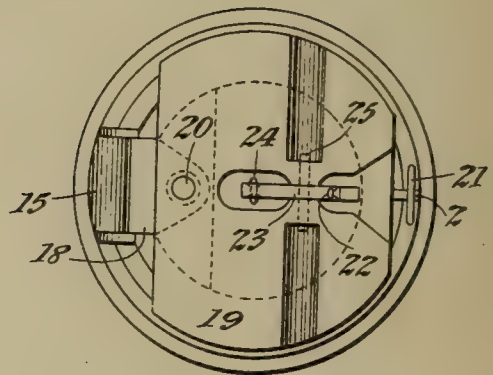
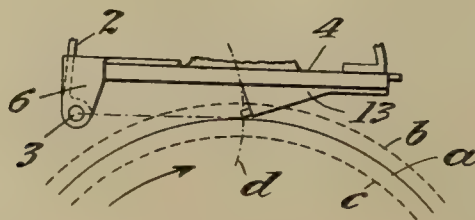


Fig. 5



Witnesses:

Frank D. Lewis
Dillon Holden

Inventor:

Edward L. Aiken
by Frank L. Aiken
Atty.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH RECORDER AND REPRODUCER.

No. 855,828.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed February 5, 1906. Serial No. 299,483.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographic Recorders and Reproducers, of which the following is a description.

My invention relates to phonographic recorders and reproducers, and more particularly to that type in which the recording or reproducing stylus is carried by a floating weight, as first disclosed in Edison Patent No. 430,278, dated June 17, 1890. In the use of a recorder or reproducer of this type with an Edison phonograph, the body is rigidly held in a traveling carrier arm which is sleeved at its rear on a fixed rod and is supported at its forward end upon a horizontal guide or straight edge, the parts being so arranged that the stylus will assume an operative position upon the surface of the record or blank when the body is properly placed in the carrier arm. The record or blank used with such an instrument is in the form of a hollow cylinder which is carried on a rotating mandrel and is of such diameter that the stylus will rest thereon and support the floating weight, as is well known. In using blanks of this character, where the record is only desired for use a short time, it is the practice to shave the record by means of a suitable shaving knife thereby forming a smooth cylindrical surface suitable for the formation of another record, so that the same blank may be used again and again. Each shaving operation, of course, reduces the radius of the blank a distance which is equal at least to the depth of the record groove, and it has been customary to use in this manner blanks, the radius of which varies as much as nine sixty-fourths of an inch. Since the floating weight must be supported by the surface of the blank and since the body of the recorder or reproducer occupies a fixed position with respect to the axis of the mandrel, it is obvious that the floating weight must turn upon its pivotal support in order to permit the stylus to operate upon blanks or records of different size. This movement of the floating weight being pivotal, it is obvious that the angle which the

cutting stylus makes with the record surface at the point of contact will vary with different positions of the weight. It is undesirable, however, that this angle should vary greatly because the cutting operation requires that the stylus be held at a definite angle with respect to the record surface in order to produce the best results, and this angle can not be varied much without detracting from the quality of the record. Reproducing styluses are also frequently designed to operate only at or very close to a given angle, and are usually held by a lever whose angle can not vary much.

My invention has for its object the production of a floating weight recorder or reproducer in which the weight will have a large range of adjustment so as to be capable of operating upon blanks of widely varying diameter and in which the arrangement of parts will be such that the variation of the angle between the stylus and the record surface at the point of contact will be a minimum.

With these ends in view, my invention consists in the features hereinafter described and claimed.

Reference is hereby made to the accompanying drawing in which

Figures 1 and 2 are a side elevation and bottom plan view respectively of a phonographic recorder embodying my invention. Figs. 3 and 4 are similar views of a phonographic reproducer. Fig. 5 is a diagrammatic view illustrating the positions assumed by the stylus when operating upon blanks of different diameters.

Like parts are designated by the same reference numerals in the several views.

Referring to Figs. 1 and 2, the recorder shown comprises the usual circular body 1 adapted to be secured in the carrier arm of a phonograph. Depending from the body 1 is an arm or plate 2 the lower end of which is provided with a pivot pin 3. The weight 4 which carries the diaphragm 5 is provided with downwardly extending ears 6 which may be integral therewith or formed in a pivot plate 7 secured thereto as shown. These ears are journaled upon the pin 3, so that the weight is capable of turning freely on said pivot to assume various positions,

one of which is indicated by dotted lines in the drawing. Secured to the upper surface of the weight 4 is an arm 8 which passes through an opening in the body 1 and is bent over as shown at 9 to form a stop for limiting the downward movement of said weight. This weight is provided with the usual rounded bearing 10 which receives the lower end of the movable tube 11. The recording stylus 12 is held in a suitable holder 13 which is secured to the diaphragm in any suitable manner. In Fig. 1 the weight 4 is shown in a medial position, that is, it may occupy positions either above or below the position shown. The arrangement is such that this position will be assumed by the weight when the stylus is operating upon a blank of medium thickness, as illustrated in Fig. 5. In this view the line *a* represents the surface of the blank which is being operated upon, while the dotted line *b* represents a blank of greater diameter and the line *c* one of less diameter. It will be observed that the axis of the pivot pin 3 is situated in a plane which is tangent to the surface of the blank *a* at the point of contact of the cutting stylus, and that as the weight turns on said axis so as to bring the stylus into operative position upon the blanks *b* and *c* the cutting edge of the stylus moves along the arc *d*. Since the center of this arc lies between planes tangent to the surfaces *b* and *c* at the points to be operated upon, the angle made by the cutting stylus upon said blanks will be more nearly uniform than if said axis were either above the plane tangent to the blank *b* or below the blank tangent to the blank *c*, in other words, its variation is a minimum.

The reproducer illustrated in Figs. 3 and 4 comprises a body 14 adapted to be secured in the carrier arm of the phonograph and provided with a diaphragm supported in the usual manner. The plate 15 depends from said body and carries a pivot pin 16 upon which are journaled depending ears 17 of the pivot plate 18. A weight 19 is provided with a vertical pin 20 which passes through an opening in the plate 18 whereby the parts 18 and 19 are pivotally secured together, and the weight 19 is capable of universal movement on horizontal and vertical axes. A pin 20 projects from the forward end of the weight into a loop 21 depending from the body 14 and thereby limits the vertical movement of the weight 19 in a downward direction. The reproducing stylus 22 is carried by the usual lever 23 which is pivoted at 25 to the weight 19 and is connected at one end to the diaphragm by the link 24. The various parts are so propor-

tioned that when the stylus is operating upon a blank of medium diameter the axis of the pin 16 will occupy a plane tangent to the surface of the blank at the point of contact of the stylus and hence will be between planes tangent to blanks of maximum and minimum diameter.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. In a device of the character described, the combination of a body, a weight pivoted thereto on a horizontal axis, and a stylus carried by said weight, said axis lying between planes tangential to the record surface at the points of contact of the stylus in its extreme operative positions, substantially as set forth.

2. In a device of the character described, the combination of a body, a weight pivoted thereto on a horizontal axis and a stylus carried by said weight, said horizontal axis lying in a plane tangential to the record surface at the point of contact of the stylus when occupying a medial position, substantially as set forth.

3. In a device of the character described, the combination of a body, a plate or disk pivoted thereto on a horizontal axis and a stylus carried by said plate, the said horizontal axis being below the plane of the weight when the latter is in its highest operative position, substantially as set forth.

4. In a device of the character described, the combination of a body and a stylus carrying plate or disk pivoted thereto on a horizontal axis situated below the plane of the weight, substantially as set forth.

5. In a device of the character described, the combination of a body, a pivot plate pivoted to said body on a horizontal axis situated below the plane of the pivot plate, a weight pivoted to said pivot plate on a vertical axis and a stylus carried by said weight, substantially as set forth.

6. In a device of the character described, the combination of a body, a diaphragm carried thereby, a pivot plate pivoted to said body on a horizontal axis situated below the plane of the pivot plate, a weight pivoted to said pivot plate on a vertical axis, a stylus lever pivoted to said weight and connected to said diaphragm and a stylus carried by said lever, substantially as set forth.

This specification signed and witnessed this 2nd day of February 1906.

EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.

L. DEVINEAU.
PHONOGRAPH REPRODUCER.
APPLICATION FILED JUNE 18, 1906.

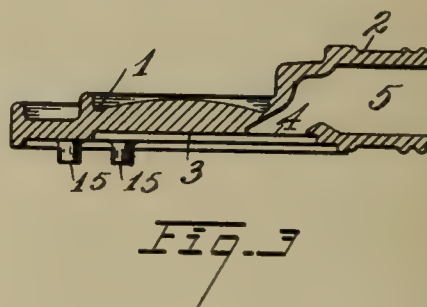
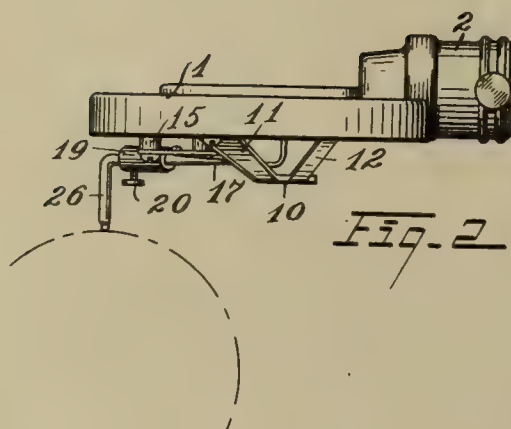
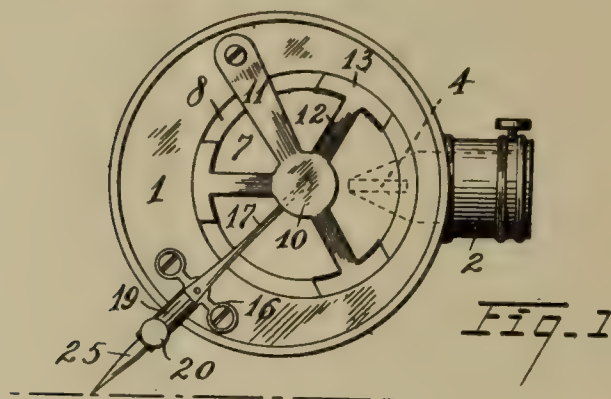


Fig. 4

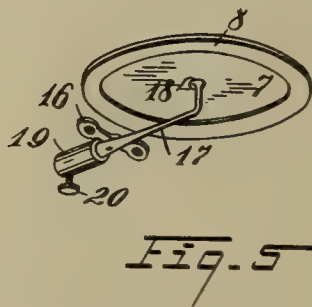
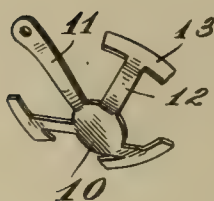


Fig. 5

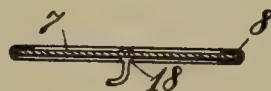


Fig. 6

WITNESSES:

Borenman West.
Ludo H. Keller.

INVENTOR,
Louis Devineau,
BY Bates, Fouts & Hull,
ATTYS.

UNITED STATES PATENT OFFICE.

LOUIS DEVINEAU, OF CLEVELAND, OHIO.

PHONOGRAPH-REPRODUCER.

No. 856,038.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed June 18, 1906. Serial No. 322,242.

To all whom it may concern:

Be it known that I, LOUIS DEVINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Phonograph-Reproducers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

One of the objects of this invention is to provide a very simple and cheap reproducer for phonographs, so arranged that the diaphragm may be easily put in place and is effectively held, but may be removed whenever desired.

Another object is to so construct the reproducer that it may be used either with the disk records or cylinder records, as desired merely by changing the needle.

The particular characteristics of the invention are hereinafter more fully described, and summarized in the claims.

In the drawing Figure 1 is a side elevation of my reproducer, in the position as used with a disk record. Fig. 2 is an edge view of the reproducer, the position being that used with a cylinder record. Fig. 3 is a section through the sound box. Fig. 4 is a perspective of the spider which holds the disk in place. Fig. 5 is a perspective of the disk with its vibrating member. Fig. 6 is a cross section through the disk, showing its connection with the vibrating member.

As shown in the drawing, 1 represents a casing which is preferably a casting partly round and having extended from it a neck 2. In the face of the casting is a circular recess 3 which is connected by the slot 4 with the bore 5 of the neck. The recess 3 is located eccentrically in the face of the casting as shown.

7 represents the diaphragm which may be of metal or other material as desired. Around the periphery of this diaphragm is placed a rubber band 8 the elasticity of which causes it to embrace the two sides of the diaphragm, as shown in Figs. 5 and 6. This diaphragm with its rubber band fits within the recess 3 and is held therein by the clamping member in the form of the sheet metal spider 10, as shown. This spider has an arm 11 extended beyond the diaphragm and this arm of the spider is secured to the casing by a screw. The spider has three other arms 12 extending outward from the central head and diagonally toward the diaphragm. These arms

carry arc-shaped heads 13 which are adapted to rest on the rubber ring 8 and hold the diaphragm in place, the arms being under tension. This method of holding the diaphragm allows it to vibrate easily; at the same time it is easily removable for cleaning or to replace the rubber ring.

Formed on the face of the casting 1 are a pair of lugs 15 to which is fastened by screws the cross arm 16 on the rod 17 which carries the reproducer needle. At its inner end, this rod is bent at right angles and secured to the center of the diaphragm, as shown at 18. Near the outer end the rod carries a sleeve 19 in which the reproducer needle is mounted the same being clamped by the set screw 20.

To remove the diaphragm it is only necessary to take out the screw which holds the arm 11 and the two screws which hold the cross bar 16.

When my sound box is used with a disk record it is placed with the vibration bar 17 at an angle at approximately 45 degrees and the reproducing needle 25 is a direct continuation of the bar. It is to be understood that the angle varies with circumstances. If it is desired to cause a louder reproduction the angle of the disk is increased; on the other hand where a low but smooth reproduction is most desired the angle is decreased. When my reproducer is used with a cylinder phonograph, the sound box occupies a substantially horizontal position, and the needle 26 is substantially at right angles with the vibration bar, as shown in Fig. 2.

The space on the inner side of the diaphragm within the rubber ring provides an air chamber which allows the whole diaphragm to act on the air producing more satisfactory sound waves than where only the central portion of the diaphragm is effective. The exit opening 4 is in the form of a narrow radial slot leading from this air chamber into the tubular bore 5. I have found that such slot assists in giving clearer reproductions.

I claim:—

1. In a phonographic reproducer, the combination of a casing, a diaphragm, a retaining member secured to the casing and having spring arms holding the diaphragm in position, and a vibration member coöperating with said diaphragm.

2. The combination of the casing having a recess, providing a seat for the diaphragm; a diaphragm occupying said recess, a spring retaining member secured to said casing and

having arms bearing against the diaphragm opposite said seat to hold the diaphragm in its recess.

3. The combination of the casing having a
5 recess, a diaphragm occupying the said recess, a member secured to said casing and having spring arms bearing against the diaphragm near its periphery to hold it in its recess, and a vibration bar mounted on the
10 casing and coöperating with the diaphragm.

4. The combination of a casing having a recess, a diaphragm, a rubber band around the same, the diaphragm and band seating in the recess, and a clamping member secured to the casing and having spring arms
15 bearing on the rubber on the outer face of the diaphragm near its periphery to hold it in its place.

5. The combination of a casing, a diaphragm, a retaining spider secured to the casing and having spring arms bearing against the diaphragm to hold it in place, and a vibration member coöperating with said diaphragm.

25 6. The combination of a casing, a diaphragm, a sheet metal spider having spring arms with arc-shaped heads adapted to bear against the diaphragm, and a longer arm, and means for removably securing such long
30 arm to the casing.

7. The combination of a casing having a recess, a diaphragm, a rubber ring surrounding the periphery of the diaphragm and extending onto opposite sides of the diaphragm, said diaphragm and ring occupying
35 said recess, and the spider secured to the casing and having arms bearing against the rubber on the outer side of the diaphragm.

8. The combination of the casing, a diaphragm, an elastic ring surrounding the periphery of the diaphragm and extending onto opposite sides of the diaphragm, a spider

secured to the casing and having arms bearing against the rubber on the outer side of the diaphragm, and a vibration bar supported by the casing and secured at the inner end of the diaphragm and carrying at its outer end a sleeve, and a reproducing needle occupying such sleeve. 45

9. The combination of a casing, a diaphragm, a vibration bar, mounted on the casing and secured to the diaphragm, and a spider mounted on the casing for holding the diaphragm, said spider comprising a central head and arms leading outward therefrom diagonally toward the diaphragm and adapted to bear against the outer side of the diaphragm, and a longer arm extending from said head onto the casing and furnishing means whereby the spider is held to the casing. 50 55 60

10. The combination of a casing, a diaphragm, an elastic band surrounding the edge of the diaphragm and extending onto each side thereof near the periphery, a clamping member having spring arms bearing against said band on the outer face of the diaphragm, and a vibration member coöperating with the diaphragm. 65

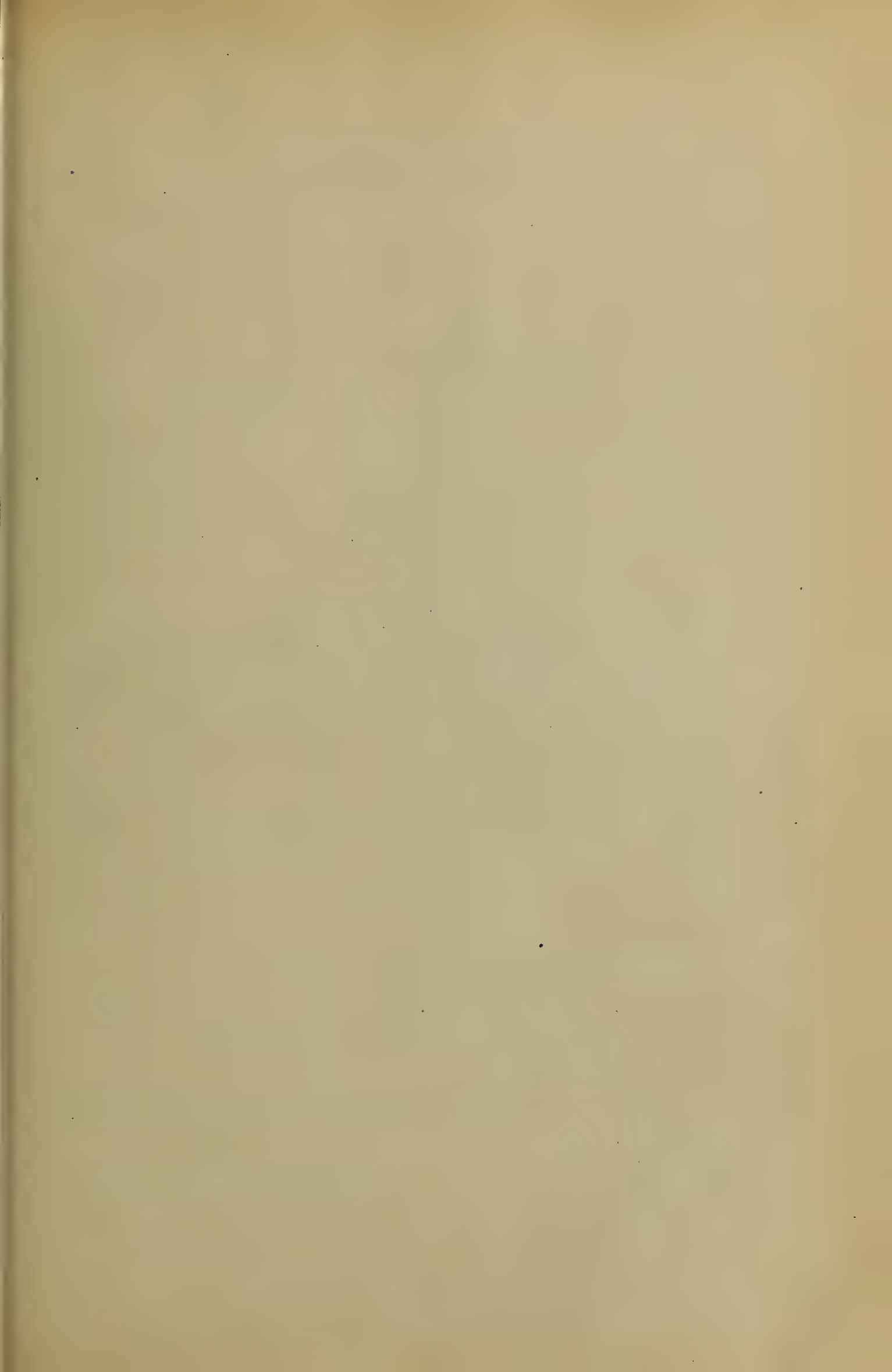
11. In a phonographic reproducer, the combination of a casing, a diaphragm, a retaining member secured to the casing and having spring arms bearing against the diaphragm, a vibration bar mounted on the casing and coöperating with the diaphragm and having a sleeve at its free end, and means for clamping in said sleeve either a straight or bent needle. 70 75

In testimony whereof, I hereunto affix my signature in the presence of two witnesses. 80

LOUIS DEVINEAU.

Witnesses:

ALBERT H. BATES,
BRENNAN B. WEST.



W. L. STILWELL.
MEANS FOR RECORDING SOUNDS.
APPLICATION FILED FEB. 19, 1907.

2 SHEETS—SHEET 1.

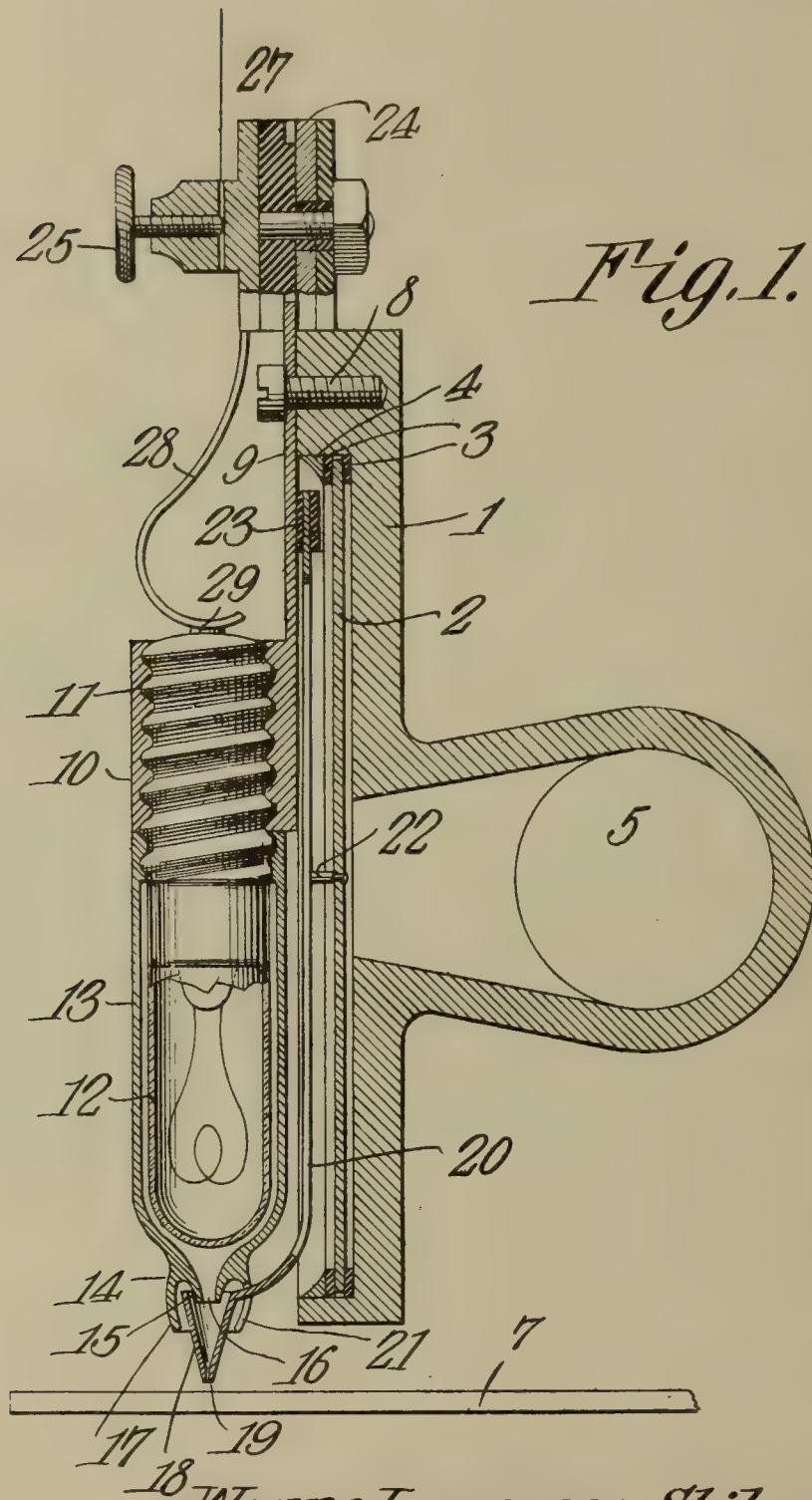


Fig. 1.

WITNESSES:

E. J. Stewart
F. J. Chapman

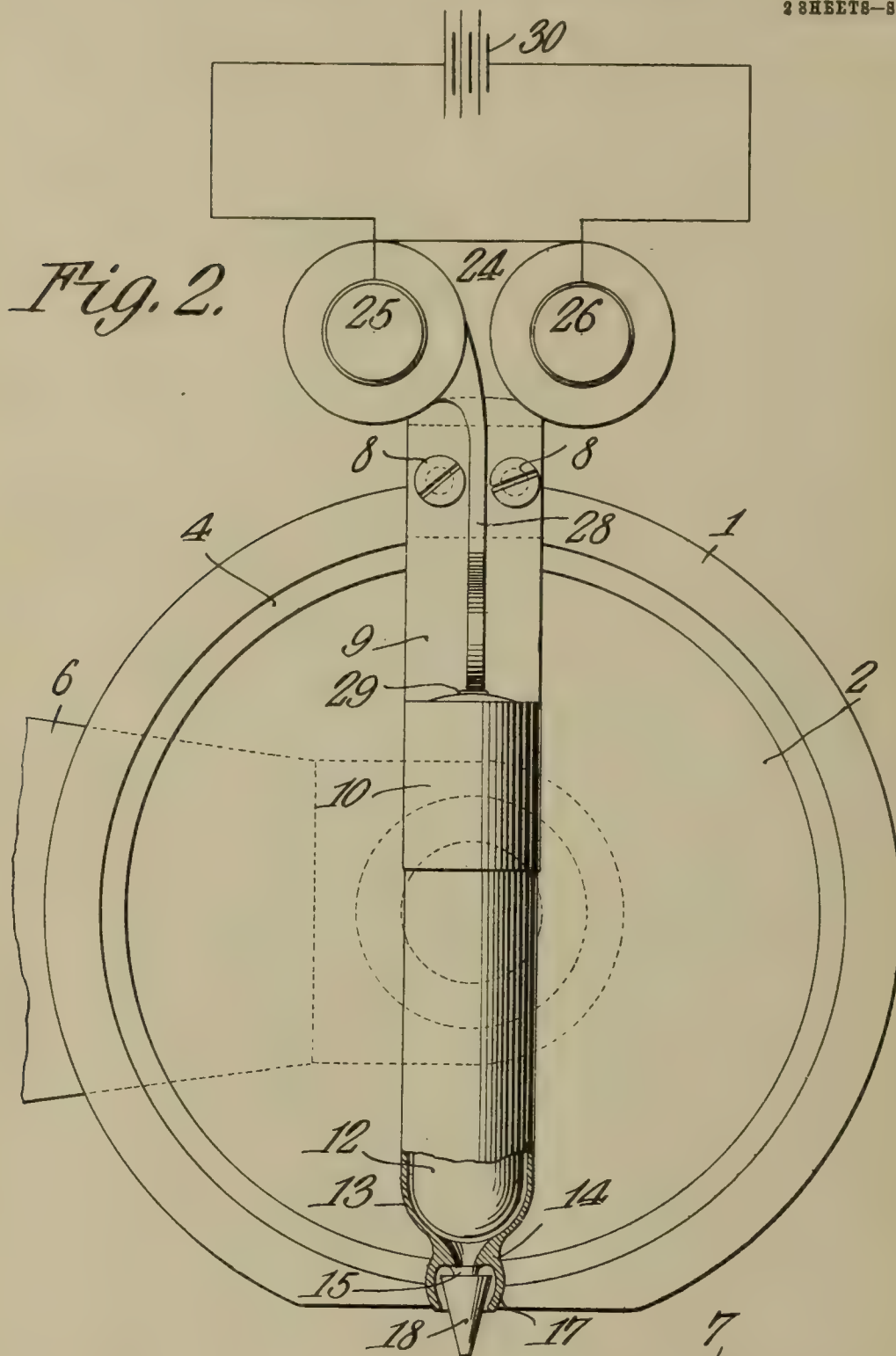
Wayne Lawrence Stilwell,
INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS

W. L. STILWELL.
MEANS FOR RECORDING SOUNDS.

APPLICATION FILED FEB. 19, 1907.

2 SHEETS—SHEET 2.



WITNESSES:

E. J. Stewart
F. J. Chapman

Wayne Lawrence Stilwell,

By

C. A. Snow & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

WAYNE LAWRENCE STILWELL, OF MILLERSBURG, OHIO.

MEANS FOR RECORDING SOUNDS.

No. 856,553.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed February 19, 1907. Serial No. 358,221.

To all whom it may concern:

Be it known that I, WAYNE LAWRENCE STILWELL, a citizen of the United States, residing at Millersburg, in the county of Holmes and State of Ohio, have invented a new and useful Means for Recording Sounds, of which the following is a specification

This invention has reference to improvements in a means for recording sounds, and its object is to produce a photographic record in the form of a sinuous line of even width representing sound waves, the record being of the type known as a gramophone record, being distinguished from the bead-like photographic records of the graphophone type.

The invention consists essentially of a recording sound box carrying a light producing unit attached to the diaphragm of the sound box, with a light directing means maintained at a constant distance from the photographic film and capable of being vibrated with the diaphragm to direct a light beam of constant width and intensity upon a photographic film so as to produce thereon a sinuous line of even width representing sound waves, along which line the sensitive emulsion is affected by the light.

In accordance with this invention there is a relative movement between the sound box and sensitive film and either or both may be moved but by preference the film is mounted upon a movable support or carrier and the sound box remains fixed.

Having produced the photographic record of the sound waves, the sensitive surface may be developed in any of the well known ways and from the negative thus obtained, and which may be treated as a master record, matrices may be made by etching in a suitable metal and using the die thus obtained for impressing suitable compositions under heat and pressure, or relief plates may be made by the chrome-gelatin or chrome-albumen processes and the reproduction may be made directly from such relief plates.

The invention will be fully understood from the following detailed description taken in connection with the accompanying drawings forming part of this specification, in which,

Figure 1 is a vertical cross section through a sound box equipped with my invention; and Fig. 2 is a face view, partly in section, of the same.

Referring to the drawings, there is shown

a sound box head 1 of usual construction carrying a diaphragm 2 of mica or glass or any other suitable material for the purpose, which diaphragm is supported at its edges between two gaskets 3 of rubber, paper, or other elastic or non-resonant material, and is retained in place by a peripheral layer 4 of wax or other suitable material.

The manner of securing the diaphragm is that commonly employed for a graphophone sound box, but the manner of securing the diaphragm by a metal clamp ring, as practiced with the gramophone type of sound box, may be equally well employed, it only being necessary that the parts to be hereinafter described be shaped to fit the different types of sound box. The sound-conveying neck 5 may be attached to the sound-intensifier 6 and to the carrying parts of the recording machine in the usual manner, which need not be here described and is not shown in the drawing.

A record receiving tablet 7 is indicated. This tablet may be in the form of a glass plate with a sensitive surface, after the manner of ordinary sensitized photographic plates, or it may be in the form of an ordinary photographic film and, in practice, will be supported upon a suitable tablet carrier either as a rotary flat table or, if desired, as a cylindrical mandrel, in which latter case the sensitive photographic surface will be cylindrical in form.

Fast upon the sound box head, being secured thereto by screws 8, is a plate 9 extending diametrically across the face of the sound box parallel to the diaphragm 2 and terminating in a screw socket 10 adjacent to but not quite reaching the center of the diaphragm. This socket may be internally threaded to receive the ordinary Edison type of lamp base 11, as shown in the drawings, or it may be constructed to receive lamp bases of any other desired type. The base 11 carries an incandescent lamp bulb 12 such as is commonly used in connection with surgical exploring instruments, and is of the tipless type, the bulb being in the form of an elongated cylinder with a dome-shaped end.

Surrounding the lamp is an opaque casing 13 having its upper end internally threaded to engage the lamp base and be thereby supported. The other or lower end of this casing is formed into a neck 14 having a con-

tracted axial portion 15 through which is a central opening 16. Surrounding the contracted axial portion 15 is a downwardly-extending bulbous hood 17 formed as part of the neck 14.

Contained within the bulbous extensions 17 of the neck 14 is a funnel 18 having its point directed downward and pierced by a fine axial opening 19 which may be almost or quite capillary in size, and the upper or base portion of this funnel surrounds and receives the contracted portion 15 of the neck 14. This funnel is carried by the lower end of an arm 20 passing through a slot 21 in the bulbous extension 17 of the neck 14. The arm 20 lies parallel with the diaphragm 2 and extends diametrically across the same, being connected to said diaphragm by a stud 22, and is secured at its upper end to the plate 9 through interposed elastic cushions 23.

The lower end of the funnel 18 is brought into close proximity with the sensitive film to be acted upon, and, in fact, it is brought as close to the film as possible without touching the same.

When a sound is uttered against the diaphragm 2 the latter is set in vibration and through the stud 22 the arm 20 sets the funnel 18 into corresponding vibrations, but, as will readily be seen, the arm 20, acting as a lever of the third order, will cause an amplification of the vibrations reaching the funnel 18, which is free to move within the bulbous hood or extension 17 without making contact with the walls of the same. Now, light radiating from the filament of the lamp finds escape only through the opening 16 at the lower end of the opaque casing 13 and is directed through the minute opening 19 as a beam of light, having practically parallel rays, upon the sensitive film. In modern practice and especially with records of the gramophone type, this beam of light need not exceed $1/300$ of an inch in width, and as the records usually run about one hundred lines to the inch, the extent of vibration of the beam of light need not be more $1/100$ of an inch in amplitude.

Since there is no frictional contact between the lower end of the funnel and the sensitive film and since the funnel and its supporting arm may be made very light, there is practically no damping effect upon the sound waves and no extraneous noises are generated, as happens when there is contact between a recording stylus and the recording surface. For this reason the over-tones are very faithfully recorded and may be as faithfully reproduced without being obscured or smothered by noises extraneous to the recorded sounds. The result is that records produced in this manner approach with great faithfulness the original quality of the sounds recorded.

In order to convey current to the lamp,

the plate 9 is extended to one side of the sound box and is there formed into a head 24 receiving two binding posts 25—26 the latter of which may be in metallic contact with the head 24, and, therefore, conductively connected with the socket head 10 receiving the base of the lamp, while the other binding post 25 is separated from the head 24 by an insulating washer 27. The binding post 25 carries a contact spring 28 carried into the path of the central conducting stud 29 of the lamp base 11. A suitable source of current, indicated by the battery 30, will be coupled to the binding post and thereby cause the filament of the lamp to glow.

It will be understood, of course, that the record must be made in non-actinic light; at least, the sensitive film must be protected from the action of light except where reached by the beam of light coming through the opening 19 of the funnel 18.

From the foregoing it will be seen that the funnel 18 vibrates parallel with the sensitive film and when there is a relative movement between this film and the sound box, whether produced by the bodily movement of the sound box or of the film or of both, the light beam will affect the sensitive plate along a sinuous path, the sinuosities of which correspond to sound waves, and that this path will always be of even width.

Having thus produced a record, the sensitive film may be developed in any of the well known ways and the record will then appear as a blackened sinuous line of even width in the photographic film. There are numerous ways of producing copies of the record so made, which record may be treated as a master record. One of these ways is to make a photo-etching in a suitable metal and to use this etching as a die by means of which record copies may be made in any of the well known compositions which soften under heat, so that the copies may be made by pressing the die into the heated and thereby softened material, which is cooled and hardened and thus retains an accurate copy of the die, which copy may be reproduced by any of the known reproducing machines on the market. Again, a positive copy of the master record may be made by the chrome-gelatin or chrome-albumen process, thus producing a groove corresponding to the sound record, which groove will extend down through the gelatin or albumen surface to the glass support upon which this surface may be carried, and the reproducing stylus running on the hard smooth surface of the glass will impart practically no extraneous noise to the reproducing diaphragm. By either of these processes the finer vibrations of high notes and the vibrations corresponding to over-tones are neither lost nor smothered out by extraneous noises, and the quality and naturalness of the original sounds are found in

the reproductions from records made in accordance with this invention.

I claim:--

1. In a sound-recording mechanism, a sound box, a source of actinic light carried thereby, means for directing said light against a photo-sensitive surface, and means for causing said light to move in a sinuous path along said photo-sensitive surface in accordance with sound waves.

2. In a sound-recording mechanism, a sound box a source of actinic light carried thereby, a sound-receiving diaphragm, and means for directing said light against a photographically-sensitive surface in a direction at right angles to the plane of said diaphragm and for causing said light to move along said photo-sensitive surface in a sinuous path in a plane parallel with the plane of vibration of said diaphragm under the action of sound waves.

3. In a sound recording mechanism, a sound box, a diaphragm carried thereby, a source of actinic light carried by the sound box, and a light directing member coacting with the source of light and connected to and constrained by the diaphragm to direct light beams upon a photographic surface in accordance with sound waves impinging on said diaphragm.

4. In a sound recording mechanism, a sound box, a diaphragm carried thereby, an electric lamp carried by said sound box, an opaque casing for the electric lamp having a light passage, an arm attached to the sound box, and a light conveyer in line with said light passage and carried by said arm.

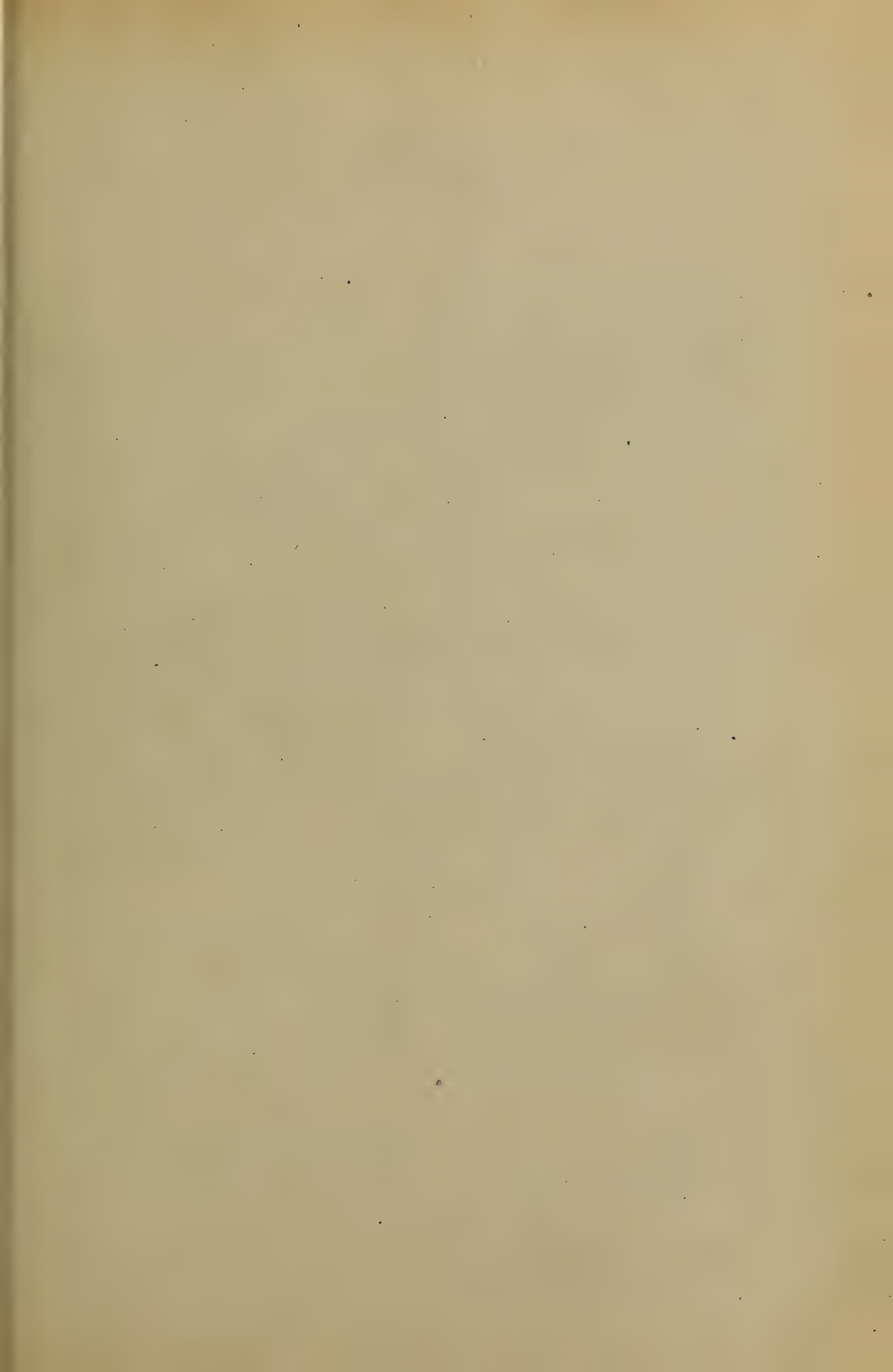
5. In a sound recording mechanism, a sound box, a diaphragm carried thereby, an electric lamp carried by said sound box, electric circuit terminals carried by said sound box and connected with said lamp, an opaque shield for said lamp having a light opening, an arm attached to said diaphragm, and a light directing member having an opening for projecting a beam of light upon a photo-sensitive surface and carried by said arm, said light projecting member being constrained by the movement of the diaphragm to move with relation to the photo-sensitive surface to cause the light beam to travel in a sinuous path corresponding to sound waves.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WAYNE LAWRENCE STILWELL.

Witnesses.

CARL SCHULER,
WELLINGTON STILWELL.



No. 856,704.

PATENTED JUNE 11, 1907.

E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED DEC. 8, 1904.

Fig. 1.

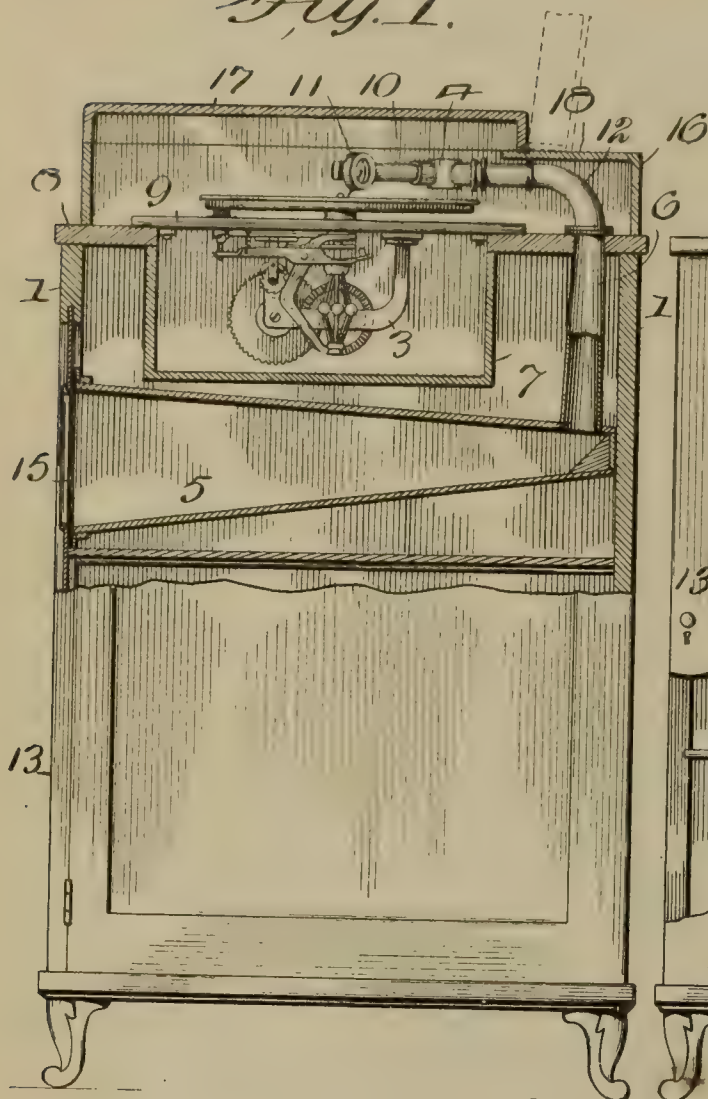


Fig. 2.

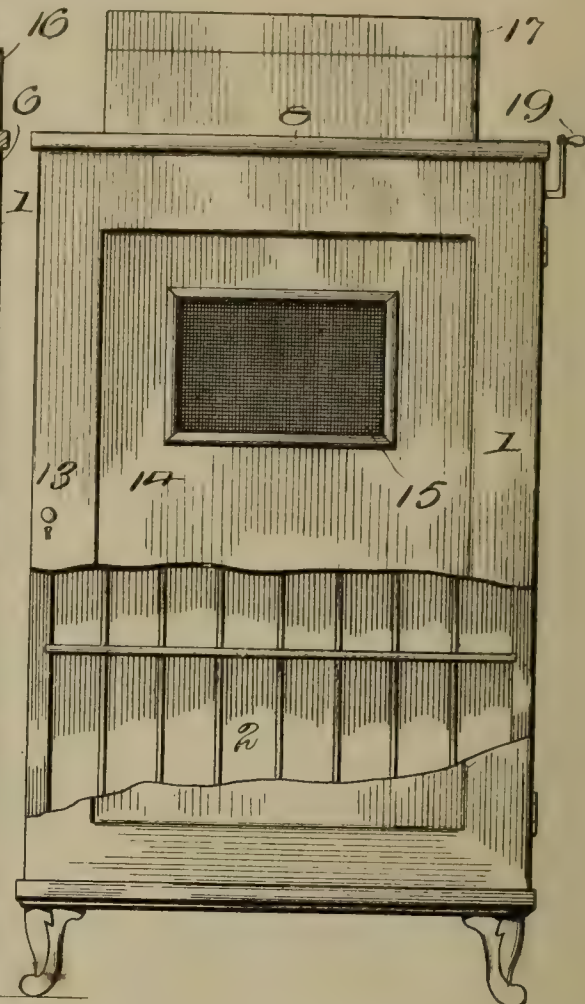
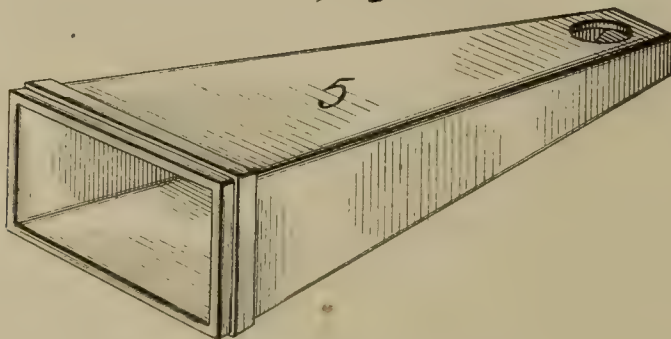


Fig. 3.



WITNESSES:

W. J. Hartman
Edw. W. Vaclav

INVENTOR

Eldridge R. Johnson
BY *Wm. Felt's*
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

No. 856,704.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed December 8, 1904. Serial No. 235,921.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide a casing or cabinet for talking machines and to arrange the parts thereof in such a manner that there will be no objectionable projections or parts extending from the body of the casing of the machines which would otherwise be liable to become injured or disarranged and also to arrange said parts in such a manner that the operative mechanism of the talking machine may be entirely inclosed, thereby making the appearance of the apparatus much more pleasing, and improving the quality and permitting the modification of the sounds produced thereby.

It is well known that in some forms and types of talking machines objectionable sounds are produced other than the musical sounds produced by the stylus following the groove of the record. Such objectionable sounds are usually a scratching produced by roughnesses in the record groove and other noises given out by parts of the machine, such as the motor when the same are moving.

By inclosing the entire talking machine, including the sound conducting tube and amplifying horn within a casing the objectionable sounds above referred to are eliminated and prevented from becoming mixed with the musical sound which it is desired to clearly reproduce. By having the amplifying horn so that it may be completely inclosed, vibrations of the walls thereof are also prevented from reaching the ear of the listener or audience and only those vibrations which are carried by the air within the amplifying horn are allowed to issue therefrom. The features of my invention regulate the quantity and greatly improve the quality of the reproduction of the sound, and in the case of the reproduction of the human voice the reproduction is rendered almost perfect, the quality and sweetness of the original tone being completely preserved and unmixed with any extraneous and harsh vibrations.

For a full, clear and exact description of this form of my invention reference may be had to the following specification and to the accompanying drawing forming a part thereof in which

Figure 1 represents my improved talking machine and cabinet therefor, shown in section at its upper portion; Fig. 2 is a front elevation thereof showing the lower portion of the front of the casing broken away, and Fig. 3 is a detail perspective view of the sound amplifying portion of the sound conducting tube.

Referring to the drawings, the numeral 1 indicates a rectangular cabinet or casing, the lower portion of which is preferably divided into a number of compartments or pigeon-holes 2, each of which is of such size and shape as to receive a plurality of records either singly or in the form of portfolios or volumes containing a number of records. The upper portion of the cabinet 1 contains the talking machine motor 3, the reproducing mechanism 4 and the amplifying portion 5 of the sound conducting tube 6. The casing 7 for the motor 3 is preferably suspended from the top 8 of the cabinet 1 and the base plate 9 of the motor 3 preferably rests upon said top 8. The reproducing mechanism 4 which comprises a pivoted hollow arm 10 having a sound box 11 attached to the outer end thereof is supported by the top 8 and instead of curving upwardly, as in the usual form of talking machines, curves downwardly as indicated at 12 and connects with the vertical sound conveying tube 6. Beneath the motor casing 7 and extending from the back to the front of the cabinet 1 is the tapering amplifying portion of the sound conducting tube and the smaller end thereof is connected with the vertical sound conveying tube 6 in any suitable manner. The front side 13 of the cabinet 1 is hinged and provided with a panel 14 in which there may be an opening covered by a fine netting or screen 15. The front side or door 13 of the cabinet may be swung on its hinges to partly or fully open or close the cabinet, and also the larger end of the amplifying portion of the sound conveying tube. When partly opened the sounds issuing from the cabinet or amplifying horn will be deflected, the character and volume of the sounds being reproduced being modified by swinging the door to different positions.

On the top of the main cabinet 1 I preferably place a secondary casing 16 forming a top compartment which has a pivoted cover 17 hinged to a fixed horizontal portion 18 of the secondary casing. This pivoted cover is of sufficient size to allow free access to the turntable and reproducing mechanism and at the same time allows the fixed portion 18 of the secondary casing to form an additional support for the reproducing mechanism. The winding shaft of the motor preferably extends through the outer main portion of the casing 1 and terminates in the winding crank 19.

It will thus be seen that I have produced an arrangement of parts in a talking machine, such that the same are very compact, and, therefore occupy less space than heretofore, the casing or cabinet is made much more pleasing in appearance, while at the same time the quality of the reproduction is greatly improved as has been shown by actual experience and tests.

Having thus described my invention it is obvious that changes may be made in the form and arrangement of the parts and mechanical equivalents may be substituted without departing from the spirit and scope of my invention, but what I claim and desire to protect by Letters Patent of the United States, is:—

1. A talking machine comprising a main casing, a movable closure for said casing, a sound reproducer within said main casing, a motor for said reproducer, a sound conveyer extending from said reproducer toward said closure, and a wall separating said motor from said sound conveyer.

2. A sound reproducing machine comprising a main inclosing cabinet, a sound reproducer within said cabinet, a motor for said reproducer, an inner motor compartment for said motor, an amplifying horn, a movable closure for said main cabinet in front of the mouth of said horn, and a sound conveying tube connecting said reproducer with said horn.

3. A sound reproducing machine comprising a main casing, an adjustable closure for said casing, a sound reproducer within said casing, an inner motor casing, a motor within said casing, a sound conveyer extending from said reproducer toward said closure beneath said motor.

4. A sound reproducing machine comprising a sound reproducer inclosed within a main casing, an inner motor casing, an amplifying horn beneath said casing, a sound conveyer connecting said reproducer with said amplifying horn, an adjustable closure in the front of the main casing and in front of the mouth of said horn.

5. A sound reproducing machine comprising a main casing, a sound reproducer within said casing, a motor compartment within said main casing, a motor in said compartment, an amplifying horn, a sound conveyer connecting said reproducer with said amplifying horn, a hinged door for said main casing in front of said amplifying horn to deflect and modify the reproduced sound.

6. A sound reproducing machine comprising a sound reproducer inclosed within a main casing, an inner motor casing, a motor within said casing, an amplifying horn beneath said casing, a series of small compartments for records below said horn, a sound conveyer connecting said reproducer with said amplifying horn, an adjustable closure in the front of the main casing and in front of the mouth of said horn.

7. A sound reproducing machine comprising a main casing, a removable cover upon said main casing, a sound reproducer within said main casing, a motor compartment within said main casing, a motor within said compartment, an amplifying horn, a sound conveyer connecting said reproducer with said sound amplifying horn, a hinged door in said main casing in the front of said amplifying horn to deflect and modify the reproduced sound.

8. A sound reproducing machine comprising a main casing, a sound reproducer within said casing, a motor, an amplifying horn and a sound conveyer connecting said reproducer with said amplifying horn all within said casing, a door for said main casing in front of said amplifying horn to deflect and modify the reproduced sound.

9. The combination with a talking machine and an amplifying horn connected thereto, of a casing completely inclosing said talking machine and horn, and swinging door in said casing located adjacent the mouth of said horn for modifying the sound emitted from the horn.

10. A sound reproducing machine comprising a main casing, a reproducer inclosed within said main casing, a motor within said main casing, an amplifying horn in said casing, a series of small compartments for records below said horn, a sound conveyer connecting said reproducer with said amplifying horn, an adjustable closure in the front of the main casing and in front of the mouth of said horn.

In witness whereof I have hereunto set my hand this sixth day of December, A. D., 1904.

ELDRIDGE R. JOHNSON.

Witnesses:

LEWIS H. VAN DUSEN,
EDW. W. VAILL, Jr.

No. 856,873.

PATENTED JUNE 11, 1907.

W. G. HORTON.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED NOV. 12, 1906.

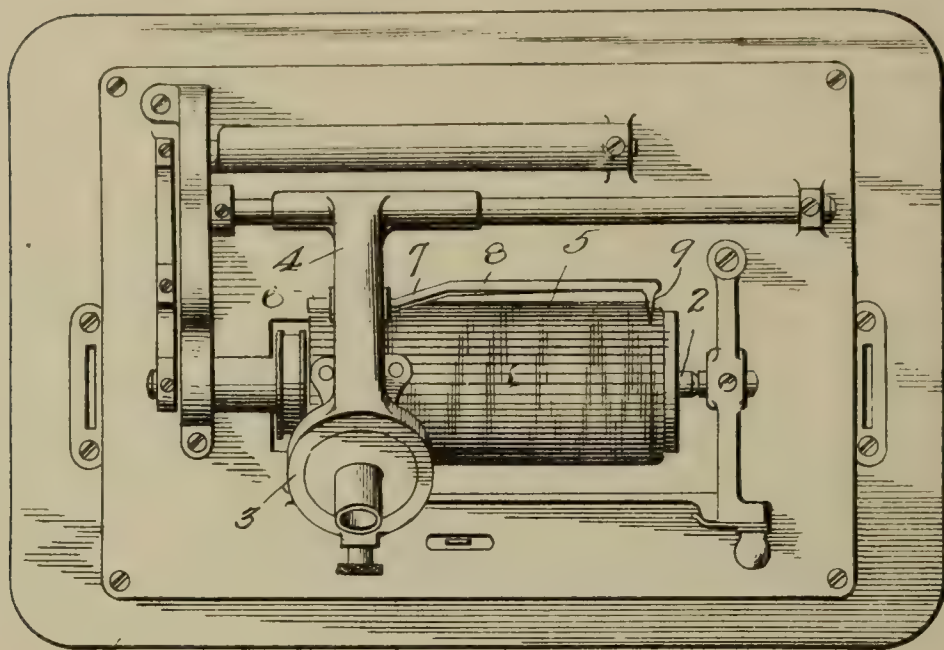


Fig. 1.

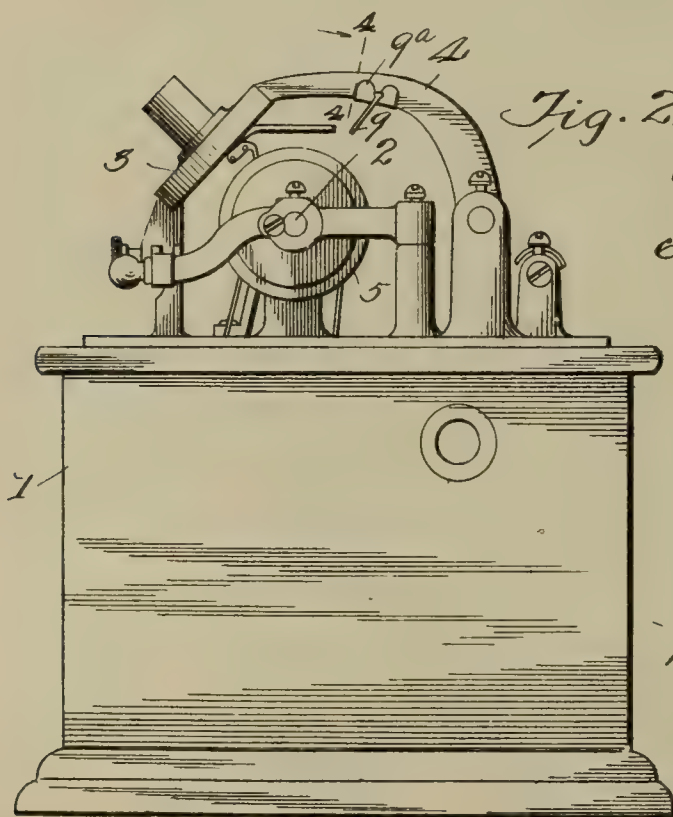


Fig. 2.

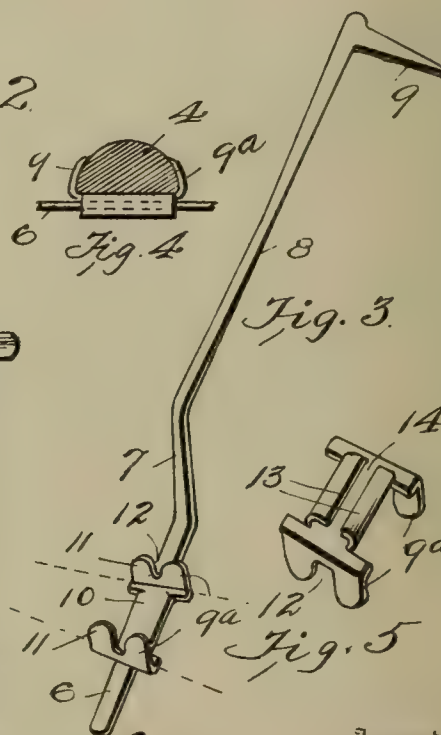


Fig. 3.

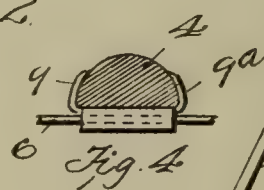


Fig. 4.

Fig. 5.

Witnesses
Chas. N. Davis,
M. E. Moore

By

Walter S. Horton
Attorney

UNITED STATES PATENT OFFICE.

WALBRIDGE G. HORTON, OF BRATTLEBORO, VERMONT.

PHONOGRAPH ATTACHMENT.

No. 856,873.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed November 12, 1906. Serial No. 343,003.

To all whom it may concern:

Be it known that I, WALBRIDGE G. HORTON, a citizen of the United States, residing at Brattleboro, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Phonograph Attachments, of which the following is a specification.

My invention relates to improvements in phonograph attachments, and has particular reference to a device for attachment to the ordinary and well known type of cylinder-record talking machine; the object of my invention, being first to provide a device or more properly a gage, by means of which the operator of the machine may readily determine the proper point at which to place the reproducer needle upon the record so that the proper reproduction of the entire record is always assured, including the announcement at the beginning of the record; second to provide such an attachment which may be quickly and easily applied to or detached from any of the well known and standard type of talking machines; and third, to provide a gage attachment which is adjustable to suit different conditions, and which will be compact and out of the way and will not interfere in any way with the working of the machine.

Further objects of the invention are to provide a device of the character set forth which will accomplish all the objects above disclosed in a thoroughly practical and efficient manner.

To attain the desired objects, my invention comprises a gage member adapted to be secured upon one of the moving parts of a talking machine, the said gage member serving to indicate the proper point at which the reproducer should be caused to engage the record to be reproduced, and the invention further consists in certain other novel features of construction and combination of parts, substantially as herein set forth.

Attention is invited to the accompanying drawings, in which:

Figure 1, is a top plan view of a talking machine having my improvements applied thereto. Fig. 2, is an end elevation of the same. Fig. 3, is a detailed perspective view of the attachment removed from the machine. Fig. 4, is a sectional view of the reproducer arm taken on line 4—4 of Fig. 2, with the gage support in position thereon,

and, Fig. 5, is a detail perspective view of the clasp or means for supporting the gage finger.

In the talking machines ordinarily in use, there is no way of determining the place at which the record commences upon the cylinder or recording agent, except by observing the serrations or grooves in the cylinder, and as at best, this is mere guess-work, I have produced a device which forms a gage by means of which the record may be reproduced from the beginning, so that none of the parts of the record are lost to the listener.

In the accompanying drawings, I have shown my improvements as applied to a talking machine of a well known type, and embodying broadly, a case 1, inclosing the motor mechanism, a mandrel 2, mounted upon the case and rotated from the motor mechanism, a reproducer 3, supported above the mandrel upon the reproducer arm 4, and a cylindrical record or tablet 5, is shown in position upon the mandrel ready for reproduction. My invention resides in a finger or pointer, and a clasp which is mounted upon the reproducer arm and adjustably supports the pointer. The pointer comprises a straight shank portion 6, having substantially parallel sides, said shank portion terminating in an offset portion 7, which is bent upwardly at an angle or incline from the shank, and thence continued laterally as at 8, on a plane parallel to the shank, and on the end of said shank, is formed a substantially right-angled point or finger 9. The body 8 of the lateral portion is bent or twisted for practically its entire length as shown in Fig. 3, so that the finger on the end thereof is directed downwardly or toward the plane of the shank of the pointer, or the finger may be bent itself so that it is directed downwardly. The entire pointer is preferably made of sheet metal in one continuous piece, but of course it may be made otherwise if so desired.

The support for the pointer comprises a clasp adapted for engagement with the reproducer arm of the machine and having a guideway to support the shank of the pointer. This support consists of a pair of angular jaws 9^a, connected by a straight bar or base 10, the upper ends of the jaws converging or inclined inwardly at 11, and preferably of tapered form as shown. These jaws are of some springy material and are provided intermediate their length with a recessed or cut-away portion 12, to add greater resiliency.

The edges 13 of the base of the clasp are bent under and toward each other to form a guideway 14, to receive the shank of the pointer. The jaws are arranged on converging lines as shown in Figs. 3 and 5, to receive the reproducer arm which is usually tapering in length. As I have stated, this support for the pointer is preferably made of springy or elastic material, and may readily be stamped from one continuous piece and bent to the proper shape.

The manner in which the support is applied to the reproducer arm is clearly shown in Figs. 1, 2 and 4, the converging jaws having clamping engagement with the sides of the reproducer arm which is tapering in length and substantially semi-circular in cross section. The shank of the pointer is clamped in the guide-way of the support by means of the in-turned edges of the base of the support, and being thus frictionally engaged, it may be adjusted longitudinally in said support.

In applying my improvements to a talking machine, the support carrying the pointer, is attached to the reproducer arm, and by trial, it is ascertained at what point the reproducer should be caused to engage the record, and when such starting point is determined, the pointer is adjusted longitudinally until the indicating finger thereon is in alinement with the end of the record, as plainly shown in Fig. 1. After this adjustment, all future records may be started with certainty at the proper place, by moving the reproducer and thereby the pointer until the pointer alines with the end of the record. By the use of my attachment, the records are protected against a great deal of the misuse now commonly experienced, since the reproducer may be dropped upon the record at the proper point so as not to scratch or scar the same, and records therefore will last much longer and be more serviceable.

From the foregoing description taken in connection with the drawings, the application of my invention will be readily under-

stood and its many advantages appreciated, it being evident that I have accomplished all the objects aimed at, and have produced a simple, practical and inexpensive attachment which will form a valuable adjunct to all talking or sound reproducing machines.

I claim:

1. A phonograph attachment comprising a clasp adapted to be mounted upon the reproducer arm of the machine, said clasp provided with a guide way, and a pointer adjustably engaged in said guide way.

2. The combination with a phonograph, of a clamp removably secured to the reproducer arm thereof, and a pointer adjustably held in said clamp and extending parallel to the record of the machine.

3. The combination with a phonograph, of a clamp having wedge engagement with the reproducer arm thereof, and a pointer secured in said clamp.

4. The combination with a phonograph, of a clamp having wedge engagement with the reproducer arm thereof, guideways formed on the clamp, and a pointer frictionally held in said guideways.

5. The combination with a clamp having inward inclined edges, and oppositely disposed inturned edges forming guideways on the back thereof, of a pointer adjustably held in said guideways.

6. In combination with a phonograph, an arm connected to the reproducer arm of the machine arranged horizontal and parallel with the record cylinder and having a pointer or indicator at its free end.

7. The combination with a talking machine, of a pointer adjustably secured to the reproducer mechanism thereof, said pointer having an angularly-deflected pointing finger on the free end thereof.

In testimony whereof I affix my signature in presence of two witnesses.

WALBRIDGE G. HORTON.

Witnesses:

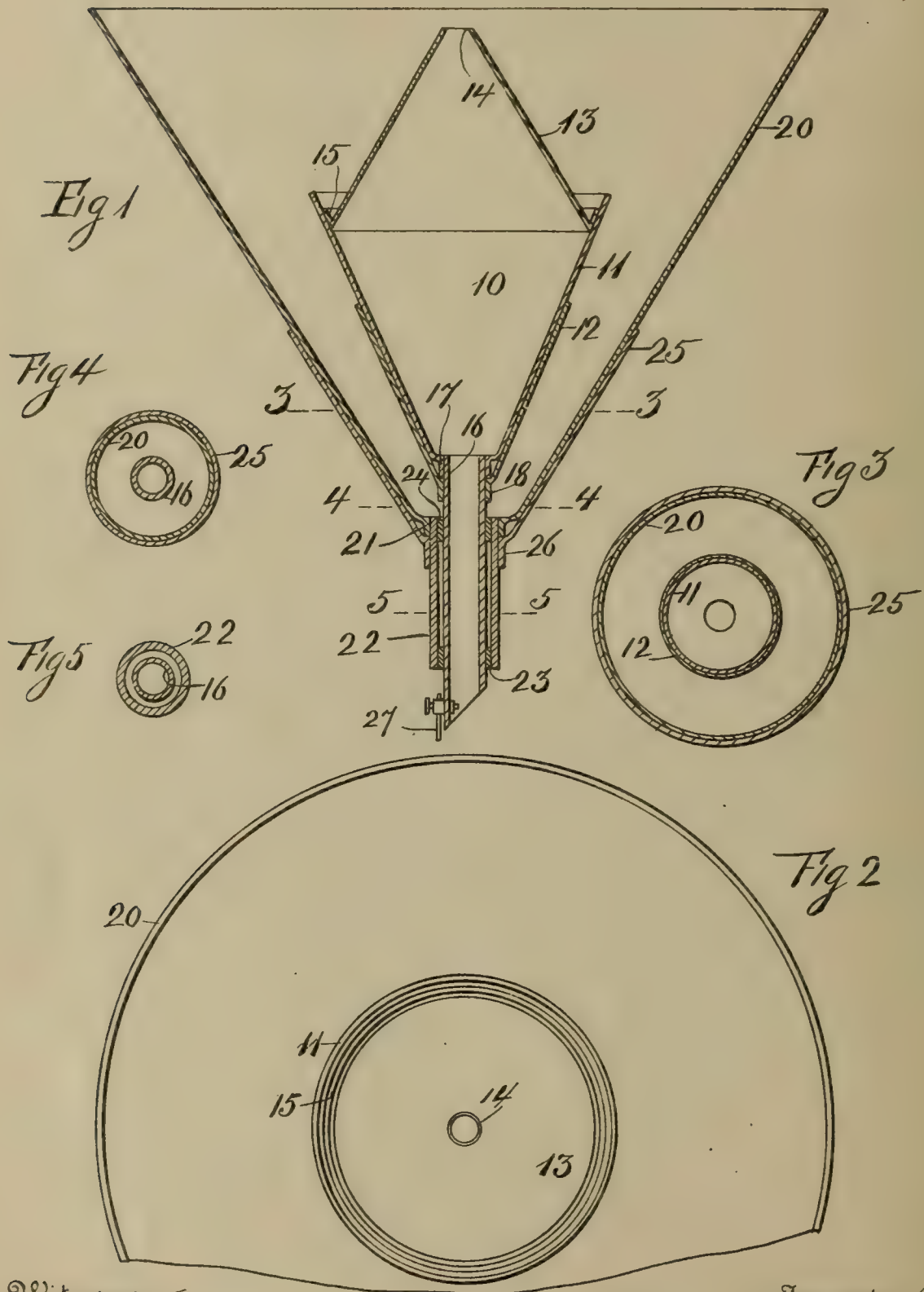
A. F. SCHWENK,
EDITH S. FARR.

No. 857,209.

PATENTED JUNE 18, 1907.

W. C. SMITH.
SOUND PRODUCING DEVICE.
APPLICATION FILED OCT. 5, 1906.

2 SHEETS—SHEET 1.



Witnesses
S. G. Van Derbeek.
M. H. Cook

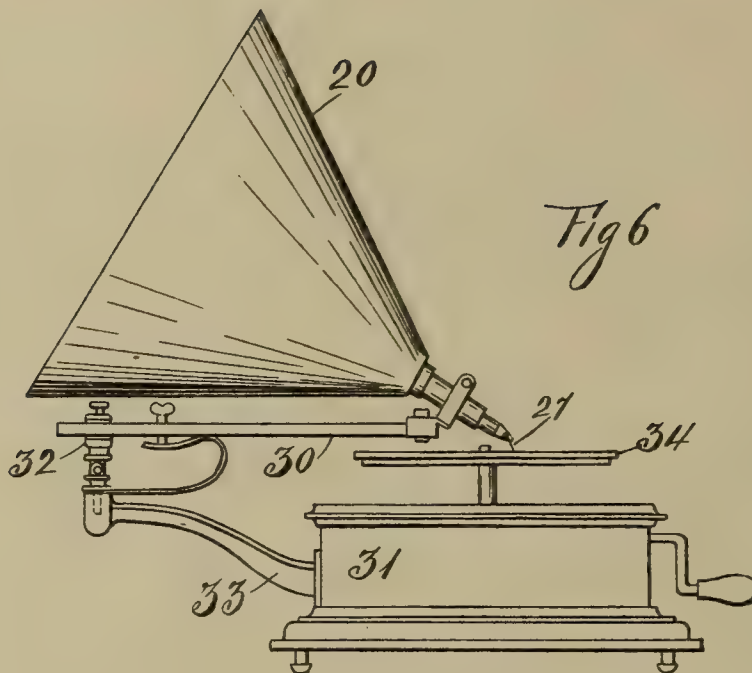
Inventor
William C. Smith
By his Attorney
Wm. B. Bomerille

No. 857,209.

PATENTED JUNE 18, 1907.

W. C. SMITH.
SOUND PRODUCING DEVICE.
APPLICATION FILED OCT. 5, 1906.

28 SHEETS—SHEET 2.



Witnesses
S. G. Van Derbeek.
M. H. Cook

Inventor
William C. Smith
By *His* Attorney
J. de Romeville

UNITED STATES PATENT OFFICE.

WILLIAM C. SMITH, OF PATERSON, NEW JERSEY.

SOUND-PRODUCING DEVICE.

No. 857,209.

Specification of Letters Patent.

Patented June 18, 1907.

Application filed October 5, 1906. Serial No. 337,620.

To all whom it may concern:

Be it known that I, WILLIAM C. SMITH, a citizen of the United States, and a resident of Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Sound-Producing Devices, of which the following is a specification.

This invention relates to a sound producing device which is specially applicable to talking machines and the like. Its organization comprises means for producing sound without the metallic effects of ordinary horns and vibrating diaphragms, securing also full loud tones, which are generally not obtained with apparatus that produces soft and modulated notes.

In the drawings Figure 1 represents a vertical axial section of the invention, Fig. 2 is a partial top plan view of Fig. 1, Fig. 3 is a section of Fig. 1 on the line 3, 3, Fig. 4 shows a section of Fig. 1 on the line 4, 4, Fig. 5 represents a section of Fig. 1 on the line 5, 5 and Fig. 6 shows a talking machine with my invention connected therewith.

The invention is shown to comprise an inner horn 10, which consists of the conical sides 11 connected to the conical supports 12, and covered with the cap 13 having the opening 14 in its apex. The cap 13 has formed at its lower edge the flange 15 which joins with the walls 11 a little below the upper end thereof. An inner tube 16 extends from the conical sides 11, a flange 17 of the sides 11 making the necessary connection between the tube 16 and the sides 11. A flange 18 extends from the support 12 and is also connected with the inner tube.

On the outside of the horn 10 is located the outer horn 20 which has the flange 21 extending therefrom, and the latter is joined with an outer tube 22 that encircles the inner tube 16, and is held in place by the sound insulating rings 23 and 24 (preferably of rubber) which separate the said tubes. A secondary conical support 25 joins with the horn 20, has the flange 26, which latter is secured to the outer tube 22. A stylus 27 extends from the tube 16 in the usual way.

In Fig. 6 I have represented the horn 20 supported by means of an arm 30 of a talking machine 31. The arm 30 is adjustably held in a clamp 32, that is pivoted to a bracket 33 of the talking machine.

The tubes 16 and 22 are preferably made of bamboo stems, although other fibrous ma-

terial may be used. The outer tube 22 need not necessarily be made of fibrous material.

The inner horn 10 is generally made of paper and the like material, while the outer horn 20 may be of fibrous or other material.

To use the invention it is connected to a talking machine as shown in Fig. 6, the record imparting through the stylus 27 vibrations to the inner tube 16, which vibrations are amplified by the inner horn 10, and modulated by its cap 13. Sound waves recede from the horn 10 and are diffused by means of the outer horn 20, the latter performing the function of a megaphone, carrying and increasing the loudness of the sound coming from the inner horn 10. The sound insulating rings 23 prevent sound waves being directly transmitted from the inner tube to the walls of the outer horn.

Having described my invention I claim:

1. In a sound producing device the combination of an inner tube, a horn extending therefrom, an outer tube encircling said inner tube, a sound insulator between the tubes, and a horn extending from the outer tube.

2. In a sound producing device the combination of an inner tube, a horn extending therefrom, an outer tube encircling said inner tube, a sound insulator between the tubes, a horn extending from the outer tube, and a stylus extending from the inner tube.

3. In a sound producing device the combination of an inner tube of bamboo, a horn extending therefrom, an outer tube of bamboo encircling said inner tube, a sound insulator between the tubes, a horn extending from the outer tube, and a stylus extending from the inner tube.

4. In a sound producing device for a talking machine the combination of an inner tube of bamboo, a conical horn extending from the tube, a sound insulator around the tube, an outer tube of bamboo around the insulator, and a conical horn extending from the outer tube.

5. In a sound producing device the combination of an inner tube, a horn extending therefrom, a cap having an opening connected with the horn, an outer tube encircling said inner tube, a sound insulator between the tubes, a horn extending from the outer tube and encircling the other horn.

6. In a sound producing device the combination of an inner tube, a horn extending therefrom, a conical support for the horn sup-

ported on the said tube, a cap having an opening secured to the horn, an outer tube encircling the inner tube, sound insulating rings between the outer surface of the inner tube and the inner surface of the outer tube, a horn extending from the outer tube, a support for the outer horn secured to the outer tube, and a stylus connected with the inner tube.

10 7. In a sound producing device for a talking machine the combination of an inner tube of bamboo, a paper horn having a flange, the flange fastened to the tube, a conical paper support for the horn having a flange, 15 the latter secured to the tube, a pair of rub-

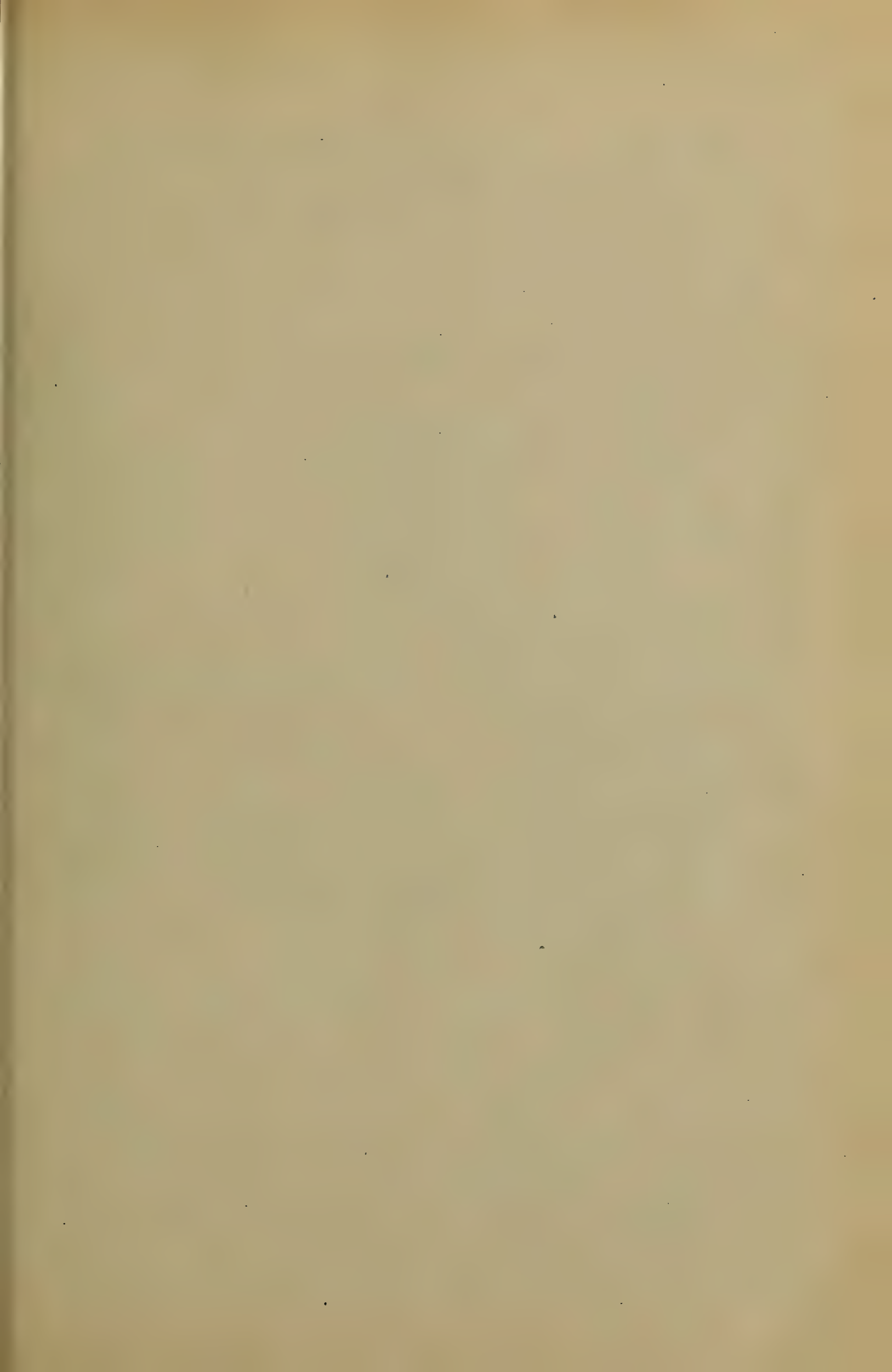
ber sound insulators around the tube, an outer tube of bamboo around the insulators, an outer paper horn having a flange with the latter fastened to the outer tube, a conical paper support for the outer horn having a flange with the latter fastened to the outer tube. 20

Signed at the borough of Manhattan in the county of New York and State of New York this 4th day of October A. D. 1906.

WILLIAM C. SMITH.

Witnesses:

S. G. VAN DERBECK,
M. H. COOK.



No. 857,483.

PATENTED JUNE 18, 1907.

M. A. POSSONS.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 14, 1906.

FIG. 1.

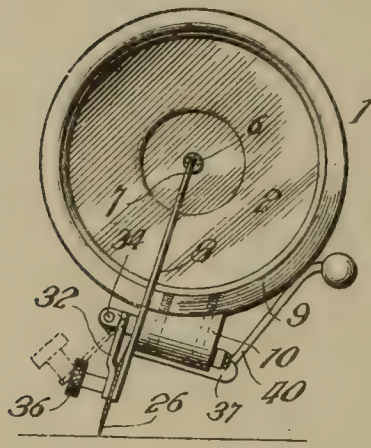


FIG. 2.

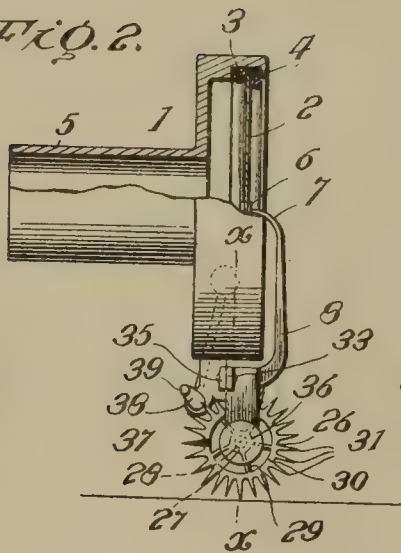


FIG. 3.

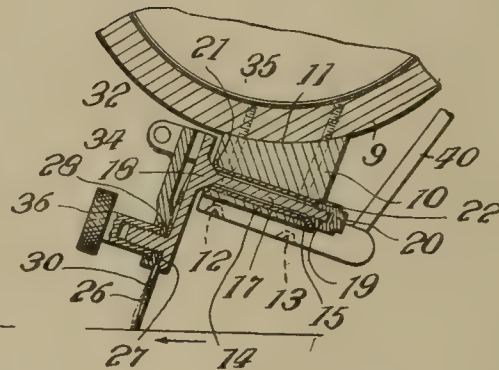
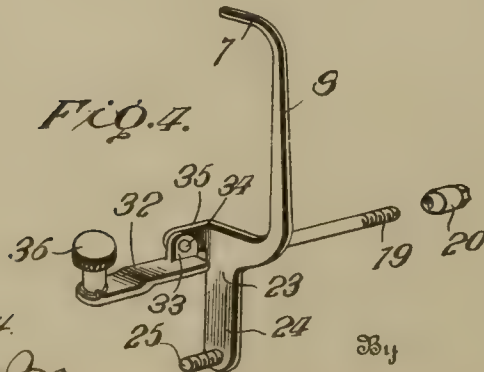


FIG. 4.



Witnesses

Louis H. Schmidt.

C. P. Wright, Jr.

Inventor

M. A. Possons.

A. S. Pattison.

Attorney

UNITED STATES PATENT OFFICE.

MINARD A. POSSONS, OF CLEVELAND, OHIO.

SOUND-BOX FOR TALKING-MACHINES.

No. 857,483.

Specification of Letters Patent.

Patented June 18, 1907.

Application filed July 14, 1906. Serial No. 326,265.

To all whom it may concern:

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in sound boxes for talking machines, and is for use in connection with that class of machines in which a disk record is used, and a metal stylus.

It is well known that in the machines which use a disk record and a metal stylus, that are now so generally used, that the needles or stylus are intended to be used but once, and that after such use the needle is removed and another unused one substituted therefor.

One object of my present invention is to avoid the necessity of removing the stylus from its support as is required in the machines now in use, by providing an improved stylus formed from sheet metal and having a plurality of closely-arranged reproducing points which can be cheaply constructed, and a new reproducing point brought into operative position by a slight rotary movement of the disk.

I am aware that it has been heretofore proposed to provide a stylus having several reproducing points which can be successively brought into operative position, but so far as I am aware a stylus has not heretofore been constructed from sheet metal of a disk-like form with a plurality of reproducing points arranged peripherally upon the disk, whereby the stylus is exceedingly cheap to produce, and whereby the reproducing points can be arranged in the closest possible juxtaposition, to permit a large number of reproducing points to be arranged upon a small disk-like member, which will enable the production of one of these disk-like styluses by a single stamping operation of about three-quarters of an inch in diameter with twenty-five reproducing points, approximately as cheap as the production of one of the single styluses now in common use, with the great resultant advantage to the user to be hereinafter pointed out.

Another object of my present invention is to so construct the stylus that it is rigid in the lateral direction of the sound waves formed upon the disk record to prevent any possible loss in the transference of the delicate variations thereof to the sounder disk, but which is flexible in a direction at right angles to these sound waves so that it will yield to the roughness and unevenness of the bottom of the sound wave groove, which is found, in practice, to very materially soften the tone and to avoid the well known grinding and grating sound very common to these instruments.

Another object of my present invention is to support this disk-like stylus with its plurality of reproducing points with the plane of its flat surface extending across the disk record, or radial thereto, and the axis thereof at right angles to said direction, which causes the lateral irregularities of the sound waves to act upon the stylus in a direction parallel with the flat plane or surface of the disk, and therefore offering a rigid unyielding stylus in that direction, but which will yield in the direction at right angles thereto for the purpose stated in the preceding paragraph.

Another object of my present invention relates to an improved oscillatable support for the stylus, and in the manner of connecting the stylus bar with the sound disk, as well as other details of specific construction of the stylus itself, as will be pointed out more fully hereinafter.

In the accompanying drawings, Figure 1, is an end view of my improved sound box. Fig. 2, is an edge elevation of Fig. 1, partly shown in section. Fig. 3, is an enlarged sectional view taken longitudinal the oscillating support for the stylus. Fig. 4, is an enlarged detached view in perspective of the stylus-carrying member.

Referring now to the drawings 1 is a sound box of the ordinary construction, having the usual diaphragm or sounding disk 2 mounted therein between the usual elastic packing rings 3 and 4, and with the usual tube 5 extending laterally therefrom by means of which it is supported and carried by the machine, and through which the sound passes to the horn. The diaphragm at its center is provided with an eyelet 6 through which passes the laterally-turned end 7 of the arm 8 and

is secured therein by means of wax or cement. Secured to the outer periphery or edge 9 of the sound box is a block 10 having its inner edge provided with a concaved face 11 corresponding with and fitting against the edge of the sound box. This block is firmly but removably secured to the sound box by means of two screws 12 and 13 shown in dotted lines, and by means of which the block with its attached parts can be detached for the purpose of repairs, or substitution. This block 10 is provided with an opening 14 which extends in a direction parallel with the plain of the diaphragm 2. Preferably this opening is provided with a bushing 15 which at its outer end is cone-shaped, as shown at 16. Passing through this bushing is a shaft 17 provided at its inner end with a cone-bearing 18, and its outer end with a removable screw-threaded adjustable cone-bearing 20, the said cone-bearings resting in and engaging the cone-shaped bearings 21 and 22 of the said bushing, whereby the shaft is free to oscillate.

Projecting from one end of this shaft is a plate 23 rigidly secured thereto, and this plate carries the rigid upwardly extending arm 8 heretofore referred to. Said plate 23 also carries a downwardly-extending arm or portion 24 to which is connected a stud bearing 25 extending from the plate in the opposite direction from the shaft 17.

My improved stylus 26 is rotatably mounted upon the stud 25, and this stud, it will be observed, extends in a direction parallel with the shaft 17 and in a direction which is tangential to the circle described by the wave-grooves formed in the disk record. This improved stylus is made by stamping from thin sheet metal, in disk-like form, and its flexibility in a direction at right angles to its face is increased by forming it with the radially-extending spokes 29 which connect at their outer ends to a flat rim 30, and this rim has formed integral therewith a plurality of outwardly-extending needle or reproducing points 31, though the number may be varied. Attention is directed to the fact that for the purpose of insuring the rigidity of these points in a direction parallel with the face of the disk, they are widened toward their inner ends, and preferably to the extent of practically intersecting at their inner ends, as shown in Fig. 2, which forms these points into an acute angle in plan view.

Formed at the center of the disk-like stylus is the central portion 27 having an opening 27 through which the said stud 25 passes. In this way the disk-like stylus is mounted to be capable of rotation in a direction corresponding to the lateral deflections of the wave-grooves of the record. It is held, in operation, for sound producing purposes against such rotation by means of an internally-screw-threaded member 36 which re-

ceives the screw-threaded portion of the stud 25. For convenience this screw-threaded member 36 is rotatably mounted in a swinging arm 32 which has a laterally turned ear 33 which is pivotally connected to an ear 35 carried by the plate 23 through the medium of a pivotal bearing 34. In this way the stylus, though mounted to be capable of rotation to successively bring the several points into operative position, is nevertheless clamped sufficiently firmly to the arm 23 to cause it to be rigid therewith for the purpose of transmitting the wave-sound inundations of the record to the diaphragm of the sound box, and as before stated, the stylus itself, because of its construction, is rigid in the direction of sound-wave deflection, so that none of the delicate, fine sound waves can be lost by flexibility, but are positively conveyed to the sound box diaphragm, while at the same time the stylus is flexible in a direction to yield to the roughness and unevenness of the bottom of the sound-wave grooves to prevent the transmission of this roughness to the sound diaphragm. In practice, this is found to be of great practical utility in the softening of the tone of the instrument, and in avoiding the usual grating or grinding sound common in such instruments. In practice these points are placed as near together as possible, and yet sufficiently far apart to prevent the interference with the record of the points at opposite sides of the operating point. This is to get as many points as possible on a single stylus, and it is found that as many as twenty-five can be placed upon a sheet metal disk-like stylus of three-quarters of an inch diameter. In this way a single stylus may be used twenty-five times without using any of the reproducing points a second time.

In a device of this character it is essential that when the stylus is turned to bring any one of the reproducing points to operative position, it must be accurately turned the proper distance to prevent any of the other points interfering with the record. To enable this to be quickly, readily and accurately done, I provide means for turning the stylus one point at a time. This consists of a lever 40 which extends through and is journaled in the block 10, the end thereof adjacent the stylus being provided with a crank arm 38 carrying a laterally-extending pin 39 adapted to engage between the points of the needle when the handle is rotated. In the position shown in Figs. 1 and 2 this handle is in its inoperative position, and has its handle end in frictional engagement with the edge or periphery of the sound box to hold it in this position and out of engagement with the stylus. The crank arm pin or stud 39 will engage between the points of the stylus when the lever 40 is rotated, and a single rotation

thereof will cause the stylus to be rotated a distance to bring a succeeding point into proper operative position in respect to the record.

5 As previously stated, although the stylus is capable of rotation to bring the points thereof into successive operation, it is clamped sufficiently tight to be rigid so far as transferring the inundations of the sound
10 waves to the sound diaphragm is concerned, and this frictional clamping of the stylus assists in the positioning of the points by preventing it from throwing by or beyond the distance it is actually moved by the crank
15 arm pin 39.

A stylus of the construction here shown will avoid to a very large extent what is considered by many to be an objection to that class of instruments which require the removal of the stylus and the substitution of a
20 new one for each tune, and will place this advantage in the hands of the user at a considerable reduction over the cost of using the ordinary single needle, and this is due to the
25 fact that the present improved stylus is formed from thin sheet metal capable of being produced by stamping it therefrom, while at the same time it has the advantage of rigidity in the proper direction to avoid the
30 loss of any of the delicate sound waves, and flexibility in the direction to largely overcome the roughness and irregularities of the bottom of the wave grooves.

I am aware that flexible needles for sound
35 producing machines of the character herein described have been heretofore devised, but so far as I know these needles or styluses have been flexible in all directions alike, so that there would of necessity be some loss in conveying the delicate sound waves to the sound
40 box diaphragm if the flexibility of the needle is sufficient to overcome the roughness and unevenness of the sound wave groove. So far as I am aware, a stylus has not been heretofore produced which is constructed to be
45 rigid in the direction of deflection of the sound waves, and flexible in a direction at right angles thereto for the purposes hereinbefore explained.

50 While I have herein shown and described what I consider at this time the most desirable specific construction of the improvements herein claimed, yet I do not limit myself thereto, for the reason that others skilled
55 in the art with the teachings of these improvements before them, could readily devise other specific constructions to carry out and accomplish the improvements and inventions herein described and sought to be claimed.

60 Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. A stylus for talking machines made from sheet metal consisting of a flat body

portion having a circular periphery consisting of a plurality of radially-extending
65 points, and having a rotatable supporting point concentric with the said circular periphery, as and for the purpose described.

2. The combination with the sound box of
70 a talking machine, of a rotatable circular-shaped stylus having a plurality of peripherally arranged points, the axis of the stylus extending in a direction at right angles to the movement of the diaphragm of the sound
75 box, as and for the purpose described.

3. The combination with the sound box of a talking machine, of a rotatable disk-shaped stylus having a plurality of radially-
80 arranged points for the purpose described, an oscillatable lever connected with the diaphragm of the sound box, and carrying the axis of the stylus arranged in a direction at right angles to the movement of the diaphragm.
85

4. The combination with the sound box of a talking machine, of a rotatable disk-shaped stylus made of sheet metal and having a plurality of concentrically-arranged
90 points for the purpose described, the axis of the stylus connected with the diaphragm and extending in a direction at right angles to the movement of the diaphragm of the sound box.

5. A rotatable stylus for machines of the
95 character referred to consisting of a disk-like member formed from sheet metal and having a plurality of reproducing points which are rigid in the direction of the sound wave deflection and flexible in a direction at
100 right angles thereto.

6. A rotatable stylus for machines of the character referred to consisting of a disk like member formed from sheet metal having
105 on its periphery a plurality of reproducing points which are widened in the direction of the sound wave deflection for the purpose described.

7. A rotatable stylus for machines of the character referred to, consisting of a disk-
110 like member having a plurality of triangular shaped reproducing points around its periphery.

8. A stylus for talking machines formed of sheet metal having a flat body portion
115 terminating in a plurality of circularly arranged triangular-shaped reproducing points.

9. A rotatable stylus for machines of the character referred to consisting of a disk-like member formed from sheet metal and
120 having on its periphery a plurality of reproducing points which are rigid in the direction of the sound wave deflection, the said member being flexible in a direction at right angles to said sound wave deflection at a
125 point between its center and said reproducing point.

10. The combination with a sound box, of

a flexible rotatable stylus carried thereby, and having a series of points, and means for rotating said stylus.

11. The combination with a sound box, of a rotatable disk-shaped stylus formed of flexible sheet metal having its periphery terminating in a series of circularly-arranged reproducing points, and means for removably securing the stylus to the sound box, and of holding it in its adjusted rotated position.

12. The combination with a sound box, of a flexible stylus carried thereby and having a series of points, and a swinging member for securing the stylus to the sound box.

13. The combination with a sound box, of a flexible rotatable stylus carried thereby and having a series of points, and a swinging member for securing the stylus to the sound box.

14. The combination with a sound box, of an oscillating member mounted thereon and having engagement with the diaphragm of the sound box, a stud carried by said oscillating member, a rotatable stylus carried by said stud and a swinging member passing over the stud and securing the stylus thereon.

15. The combination with a sound box, having the usual diaphragm, of an eyelet carried thereby, and a stylus-carrying member secured at one end within the eyelet.

16. The combination with a sound box having the usual diaphragm, of an eyelet carried thereby, an oscillating member carried by the sound box, a stylus carried by one end of said member and the opposite end secured within the eyelet carried by the diaphragm.

17. The combination with a sound box, of a stylus stamped from a single piece of flexible metal in the form of a wheel, and having a series of points carried by the outer periphery thereof.

18. The combination with a sound box, of a stylus stamped from a single piece of flexible metal in the form of a wheel, a series of points carried by the outer periphery thereof and the spokes of said wheel-like member being thin to give the desired flexibility to the points.

19. The combination with a sound box, of a stylus formed in one piece from a sheet of flexible material with a series of peripherally arranged points.

20. The combination with a sound box, having the usual diaphragm, of an eyelet carried thereby, an oscillating member carried by the sound box, a stylus carried by one end of said member, the opposite end turned laterally and passing through the eyelet, and means for securing the said laterally turned portion within the eyelet.

21. The combination with a sound box, of an oscillating member mounted thereon, and

having one end engaging the diaphragm of the sound box, a stud carried by the lower end of the oscillating member and having its outer end screw-threaded, a rotatable stylus carried by said stud, an arm pivotally supported by the oscillating member and adapted to swing over the stud, and a swiveled nut carried by the arm and adapted to screw upon the stud and holding the stylus thereon.

22. The combination with a sound box, of a rotatable stylus carried thereby and having a series of points, and means independent of the record for rotating said stylus.

23. The combination with a sound box, of a disk-shaped stylus rotatably mounted thereon, and a series of points carried by the outer periphery of said disk, and means for rotating the disk and means for holding the disk in its adjusted position.

24. The combination with a sound box, of a disk-shaped stylus rotatably mounted thereon, a series of radially-arranged points carried by the outer periphery of said disk, and means for holding the disk in its adjusted position.

25. The combination with a sound box, of a disk-shaped stylus rotatably mounted thereon, a series of radially-arranged points, said stylus having an indicating mark to indicate the starting point, and by which it is determined when all of the points have been used.

26. The combination with a sound box, of an oscillating member carried thereby and having one end secured to the diaphragm of the sound box, a disk-shaped stylus rotatably mounted upon the opposite end of said oscillating member, a series of radially-arranged points carried by the outer periphery of the stylus, and means for rotating said stylus.

27. The combination with a sound box, of an oscillating member carried thereby, a disk-shaped rotary stylus carried by said member, a shaft rotatably carried by the sound box, a crank carried by the shaft and having an outwardly-extending pin adapted to engage the points and to turn the same the distance between the points during each rotation of the shaft.

28. The combination with a sound box, of a disk-shaped stylus rotatably carried thereby and having a series of points carried by its outer periphery, and means independent of the record for rotating the stylus the distance between two of the teeth during each movement.

29. The combination with a sound box, of a disk-shaped stylus rotatably carried thereby and having a series of points, a rotary shaft adjacent the stylus, and means carried by the shaft for moving the stylus the distance between the points during each rotation of the shaft.

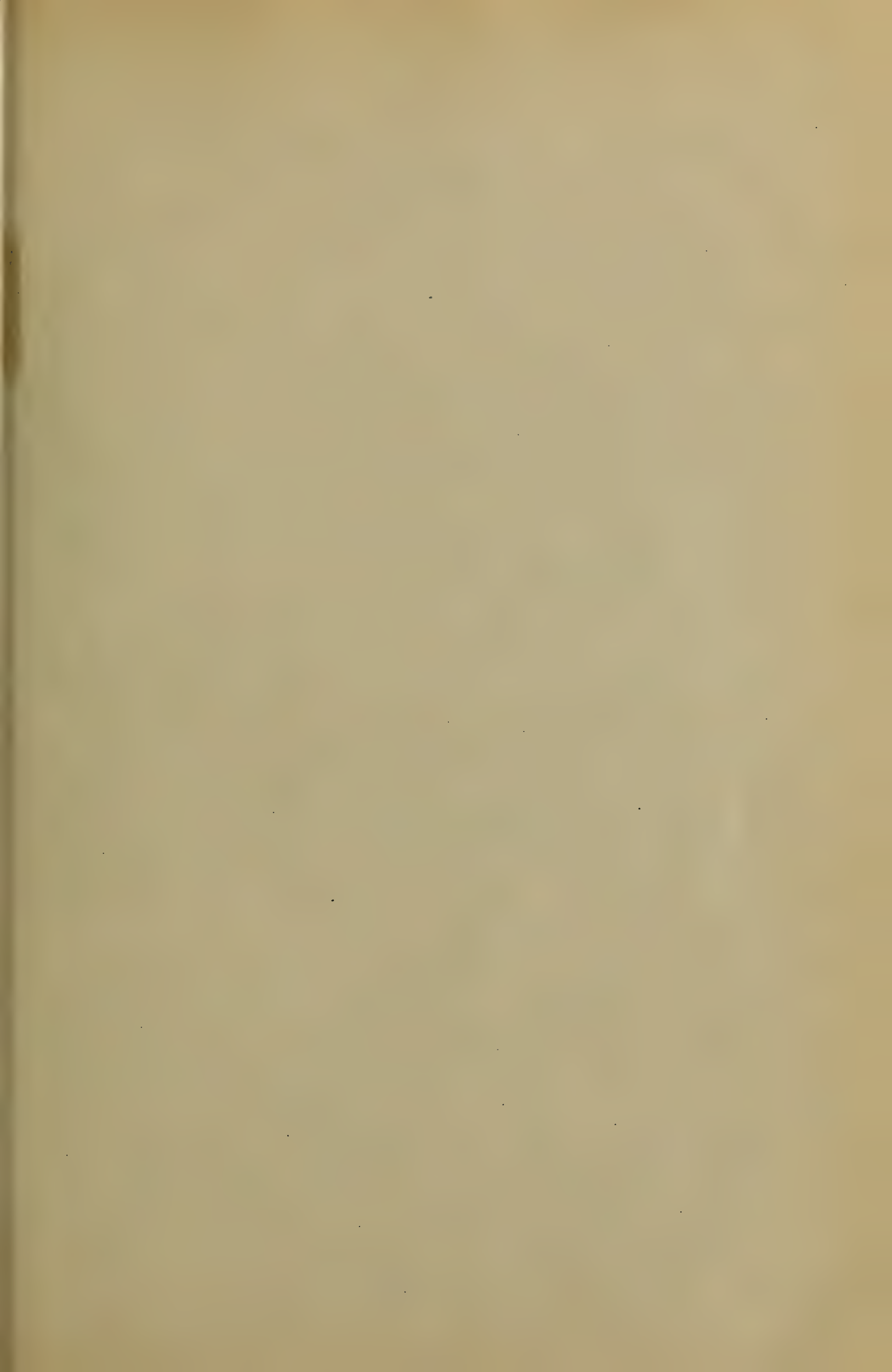
30. The combination with a sound box, of
a disk-shaped stylus rotatably carried there-
by and having a series of points, a rotary
shaft adjacent the stylus, and means carried
5 by the shaft for engaging the points and mov-
ing the stylus the distance between the
points during each rotation of the shaft.

In testimony whereof I affix my signature
in presence of two witnesses.

MINARD A. POSSONS.

Witnesses:

C. J. BLACKFORD,
F. T. BATCHELOR.



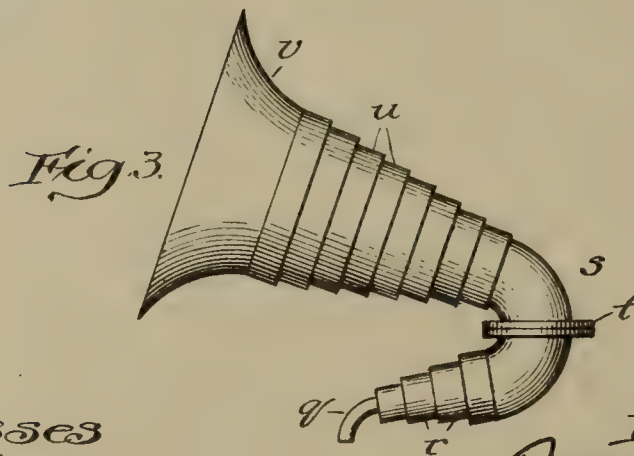
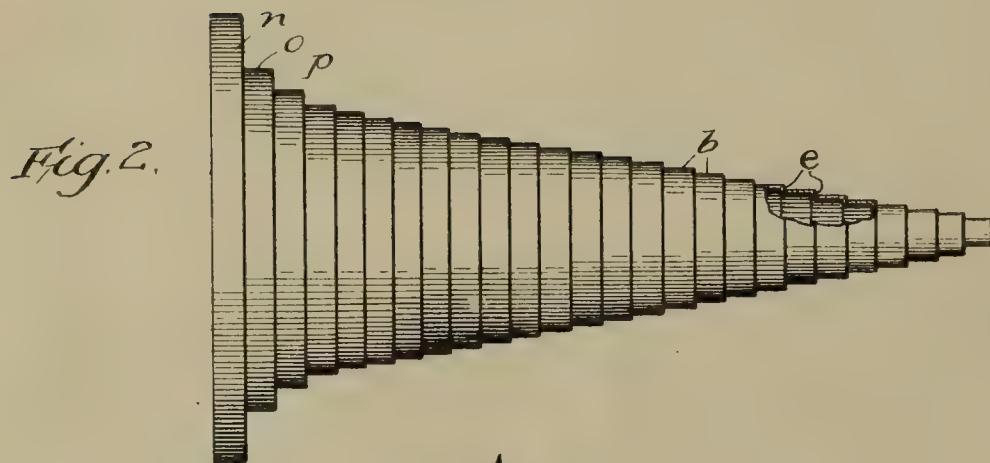
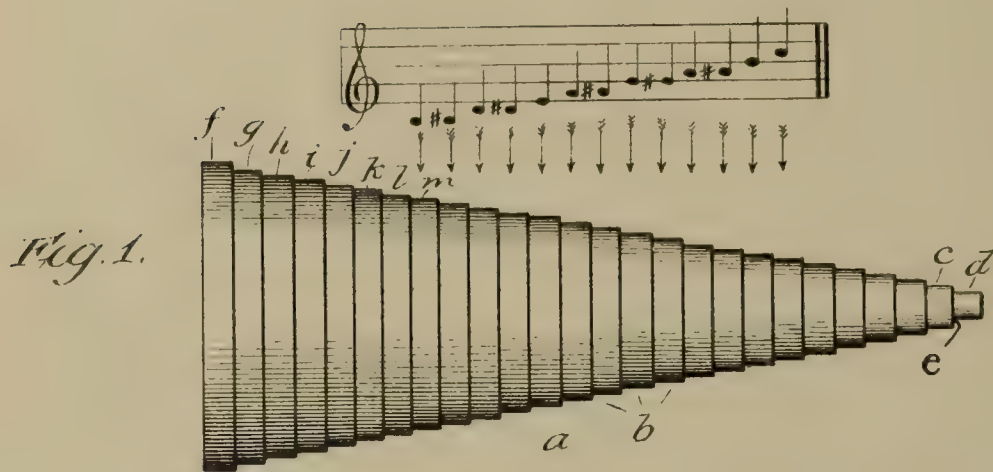
No. 857,765.

PATENTED JUNE 25, 1907.

R. J. SMITH.

HARMONIC HORN.

APPLICATION FILED NOV. 5, 1906.



Witnesses
Harry R. L. White
Ray White

Inventor
Reuben J. Smith.
By David H. Fletcher,
Atty

UNITED STATES PATENT OFFICE.

REUBEN J. SMITH, OF WAUKEGAN, ILLINOIS.

HARMONIC HORN.

No. 857,765.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed November 5, 1906. Serial No. 342,152.

To all whom it may concern:

Be it known that I, REUBEN J. SMITH, a citizen of the United States, residing at Waukegan, in the county of Lake and State of Illinois, have invented a new, useful, and Improved Harmonic Horn, of which the following is a description, reference being had to the accompanying drawings forming a part of this specification, in which corresponding letters of reference in the different figures indicate like parts.

It is well known that a tapered horn or trumpet, while capable of amplifying sound, tends to distort it by muffling the tones and rendering them indistinct and unnatural. Long continued investigation has convinced me that this objectionable characteristic of the tapered horn is owing to the fact that its shape renders it largely if not entirely incapable of vibration, and tends to muffle and distort sounds passed through it.

The object of my invention is to overcome this defect and to produce a horn for use upon phonographs and, otherwise, which shall not only be sonorous in its action, so as to retain the life-like and resonant qualities of sounds amplified thereby, but shall, by preference, be so constructed as to harmonize with and respond sympathetically to musical sounds transmitted thereto, so that in use, each musical tone may be amplified while retaining the quality and timbre of the original. I have discovered that a horn, when made of metal or other resonant material in the form of a series of connected hollow cylinders, varied in diameter, not only possess a marked resonant quality throughout its length, but that the several sections are capable of producing sounds of varying pitch corresponding to the variations in diameter, thus rendering it possible to construct a horn adapted to respond to the notes of a musical scale. I have found in practice that such a horn, even when made in regular diametrical gradations, serves to greatly improve the tones when used in connection with a phonograph or similar instrument, and it is this principle upon which my improvement is based, all of which is herein after more particularly described and definitely pointed out in the claims.

In the drawings, Figure 1, is a side elevation of a horn embodying the features of my invention, accompanied by a musical scale. Fig. 2, is a similar view showing a modification thereof, and Fig. 3, is a side elevation of

a curved horn swiveled at the curve upon a vertical axis.

Referring to the drawings, *a*, Fig. 1, represents generally a horn which, instead of being tapered or upon regular lines, is made up of a series of rigidly connected cylinders, *b*,—the smaller one *c* being connected with the tube *d* through which sounds enter the horn, by means of a step *e*, adjacent to said tube and the second with the first by means of a like step and so on throughout the series,—each cylinder being increased in diameter as compared with the preceding one, so that the vibrations thereof per second may by preference bear a proper ratio to those of the other sections of the series, thus enabling the intervals of an octave to possess the proper musical consonances.

I prefer to make my improved horn from metal or metallic alloy, such, for example, as bronze, brass or steel, which may be swaged by means of dies or spun upon a mandrel properly spaced with reference to the ratio of vibrations of the musical gamut or it may be molded, or otherwise formed, from other sonorous material. In "voicing" said horn, or in other words, proportioning the relative diameters of the different sections with a view to having them respond respectively to predetermined notes of a musical scale. I prefer that the recognized ratio of vibrations for producing such notes should be observed. For example, assuming the cylinder *f* to be capable of producing a number of vibrations arbitrarily represented by 24, then, following the chromatic scale, *g* would stand to it in the ratio of 27, *h*, of 30, *i*, 32, *j*, 36, *k*, 40, *l*, 45 and *m*, 48; or, in other words, if *f* were to make 240 vibrations per second, then *g* in the same time should give 270, *h*, 300, *i*, 320, and so on throughout the interval according to established data, governing the ratio of musical vibrations.

Instead of spinning, or swaging the horn upon a mandrel, it may be cast from resonant metal in stepped form and then turned in a lathe. By this means the several cylinders may be "voiced" with great accuracy, or it may be formed in separate cylinders and the parts soldered or brazed together.

It is obvious that the device may be extended to any desired number of octaves and thereby adapted to amplify and harmonize with the several notes produced by an orchestra.

In Fig. 2, I have shown a modification of

said invention to the extent that the cylinders of larger diameter, such, for example, as n , o , p , bear an arbitrary ratio to each other, which may be a full interval or octave, or any arbitrary intermediate, such as a "third" or "fifth," adapted to harmonize with the other cylinders of the horn, the remaining cylinders corresponding to those shown in Fig. 1, which merely extends the scale shown in said last named figure.

In Fig. 3, is shown a still further modification, in which is represented a tube q adapted to be connected with a source of sound, a series of voiced cylinders r , a curved elbow, generally designated by s , having a swiveled joint t therein, a second series of cylinders u connected with the upper half of the elbow and a bell v connected with the last of the cylinders u . This enables the harmonic principle of my invention to be applied to a bent and jointed horn so that the bell may be adjusted to stand in any desired direction permitted by the vertical axis of the joint t .

Further modifications may be made in the appearance of the horn, such for example as fluting or corrugating the bell to give it a more artistic appearance, but none of these

modifications would vary the principle of my invention, which consists in making the horn wholly or in part of a series of cylinders.

While my harmonic horn is intended more especially for use in connection with graphophones, the principles thereof may be applied to musical instruments, such, for example, as clarinets or other analogous devices.

Having thus described my invention, I claim:—

1. A sound amplifying horn in which is combined a series of successive, hollow, rigidly connected cylinders, each successive cylinder being larger than the preceding one in the order of succession from small to large.

2. A horn in which is combined a series of successively connected integral hollow cylinders proportioned to bear a vibratory ratio to each other substantially corresponding to that of a musical scale.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses, this 22d day of October 1906.

REUBEN J. SMITH.

Witnesses:

D. H. FLETCHER,
L. B. ORRINGTON.

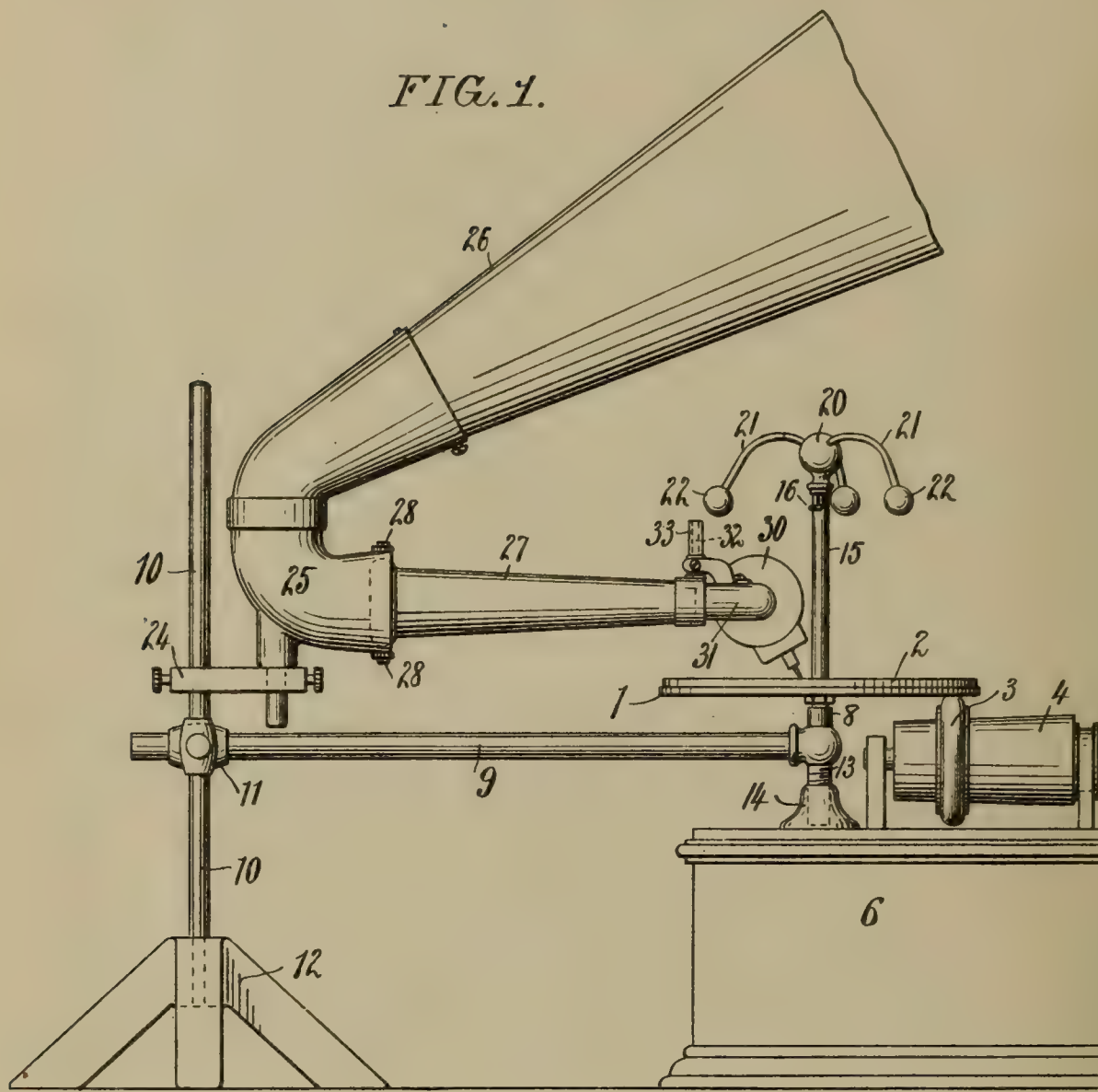
No. 858,077.

PATENTED JUNE 25, 1907.

D. KLINE.
TALKING MACHINE.
APPLICATION FILED JAN. 31, 1907.

2 SHEETS—SHEET 1.

FIG. 1.



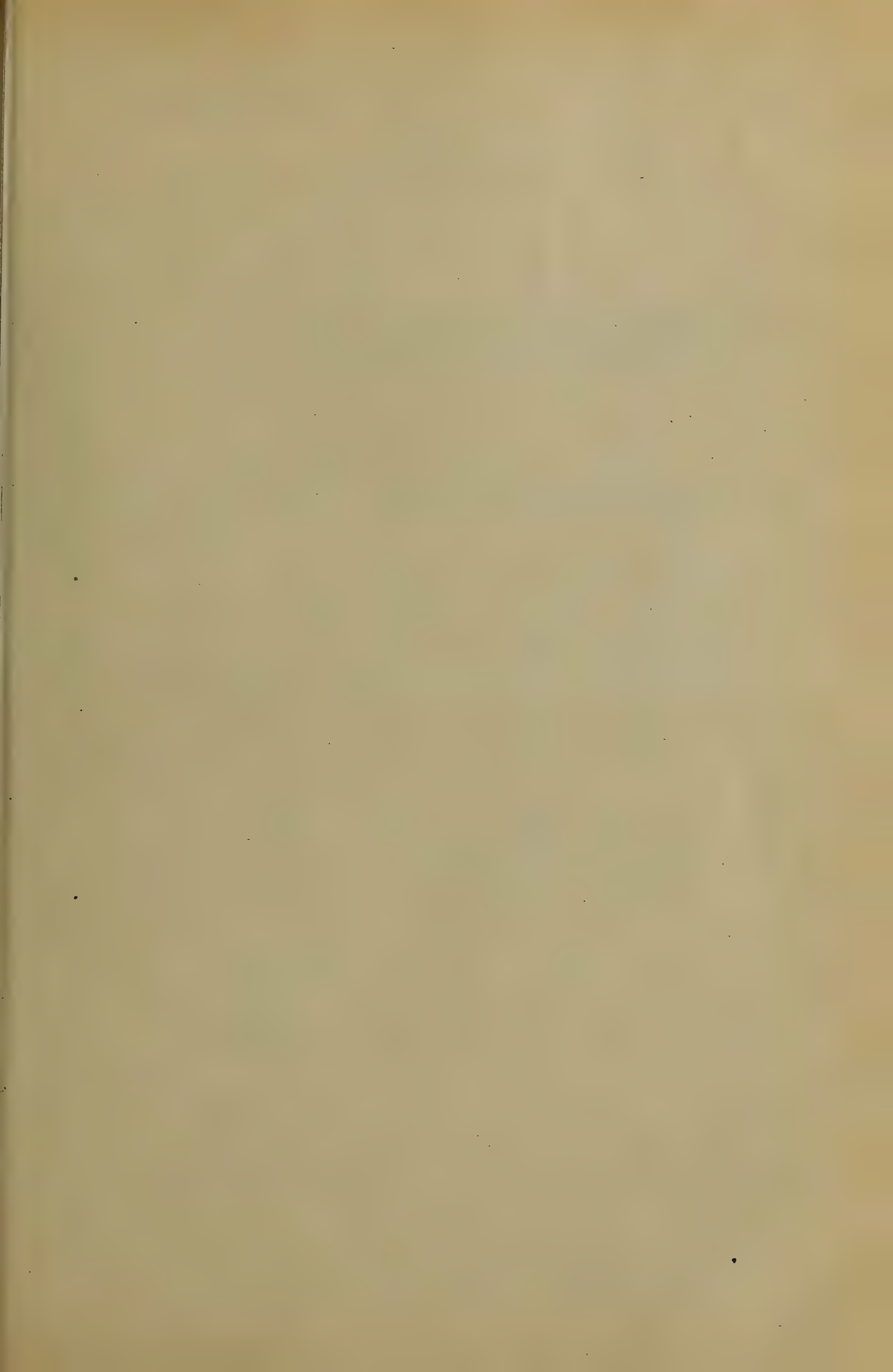
WITNESSES:

M. R. Ireland
Gilbert H. Fox

INVENTOR

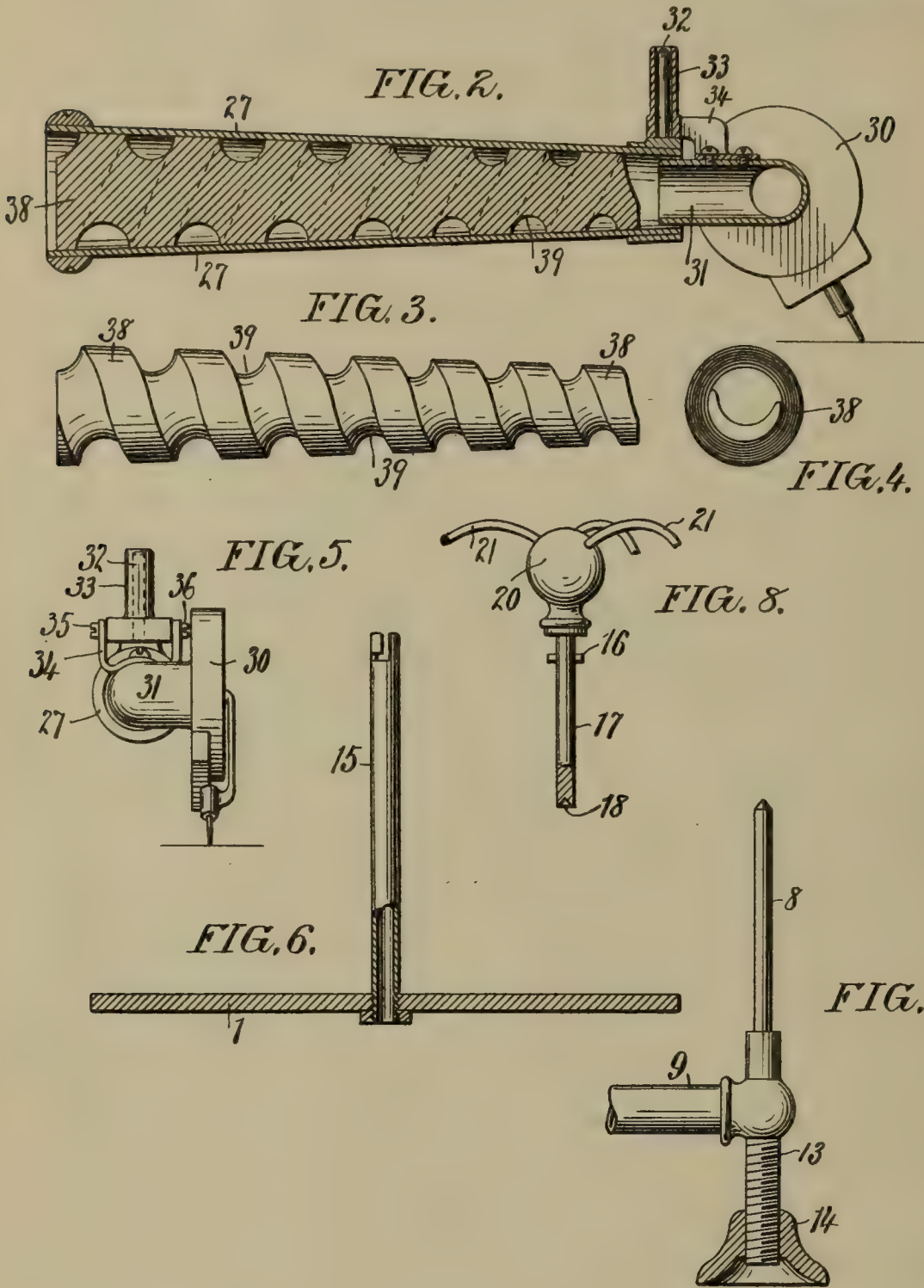
David Kline

By *H. H. Witt Goodwin*
Attorney



D. KLINE.
TALKING MACHINE.
APPLICATION FILED JAN. 31, 1907.

2 SHEETS—SHEET 2.



WITNESSES:

Wm B. Cleveland
Gill & Co.

INVENTOR

David Kline

By *F. H. Witt Goodwin*
Attorney

UNITED STATES PATENT OFFICE.

DAVID KLINE, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

No. 858,077.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed January 31, 1907. Serial No. 354,958.

To all whom it may concern:

Be it known that I, DAVID KLINE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking machines and the object of my invention is to provide a construction for pivotally connecting the sound-box and the sound-conveying-arm so that the weight of the latter will not come on the record-disk, and the sound-box will be free to rise and fall without lifting the weight of the sound-conveying-arm; a further object of my invention is to provide a core having an annular spiral recess formed in its surface, which core is adapted to be inserted in the sound-conveying-arm to lengthen the distance of the passageway through which the sound travels in coming from the sound-box; a still further object of my invention is to construct a stand for supporting the parts of the talking machine so that the same may be readily attached to a phonograph having a cylindrical record drum, thus utilizing the means for driving the said drum to operate the record-disk; a still further object of my invention is to improve the manner of mounting the record-disk.

Referring to the drawings:—Figure 1 is a side elevation of a talking machine embodying my invention; Fig. 2. is a longitudinal sectional view through the sound-conveying-arm; Fig. 3. is a side view of the core detached; Fig. 4. is an end view of Fig. 3; Fig. 5. is an end view of Fig. 2, showing the manner of mounting the sound-box; Fig. 6. is a side view of the record-disk-table, partly in section; Fig. 7. is a side view of the pivot-post, detached, upon which the record-disk-table is mounted; Fig. 8. is a side view of the means used to secure the record-disk upon said pivot-post.

In the drawings 1 represents the record-disk-table and 2 the record-disk. The record-disk-table is rotated by a friction ring 3 mounted on the revolving cylinder or drum 4 of a phonograph, having the usual mechanism for driving the said cylinder located within the casing 6.

My improved means for mounting the record-disk consists of the pivot-post 8 carried by an arm 9, connected to the vertical stand-

rod 10 by an adjustable head 11. The stand-rod 10 has a reduced portion at its lower end to form a shoulder, and the end of the stand-rod fits into an aperture formed in the base 12 which is made heavy to support the weight of the different parts of the device. The lower portion 13 of the pivot-post 8 is screw-threaded to receive a nut 14 which rests on the casing 6. By turning the said nut 14 the pivot-post 8 can be raised or lowered to vary the amount of friction between the ring 3 and the record-disk-table 1.

The record-disk-table has a sleeve 15, which fits over the pivot-post 8, and the said sleeve has slots formed in its upper end into which is locked the projections or pins 16 on the shaft 17. The said shaft 17 has a conical recess 18 formed in its lower end which fits over the conical end of the pivot-post 8. The shaft 17 and the pivot-post 8 are of sufficient length when placed together to suspend the sleeve 15 carrying the record-disk-table 1 so that the same will rotate on the conical end of the pivot-post 8. The shaft 17 has a head 20 from which project arms 21 carrying weights 22 which act as a balance or governor to steady the movement of the record-disk-table. The stand rod 10 carries an adjustable bearing 24 in which is mounted the usual form of elbow 25 and trumpet 26 used in talking machines. The elbow 25 carries a sound-conveying-arm 27 pivotally mounted between the set-screws 28 which support the outer end of the said arm.

The sound-box 30 has a tube 31 which is of smaller diameter than the end of the sound-conveying-arm 27 and is supported so that the end of the tube may enter the end of the said arm 27 without contacting with the latter. The said arm 27 carries a pin 32 over which fits a sleeve 33 pivotally mounted in a bearing 34 secured to the tube 31 of the sound-box. The sleeve 33 rests upon the end of the arm 27 and the sound-box may rise and fall on the pivot points 35 and 36 and may also swing horizontally by rotating on the pin 32.

Fig. 3. illustrates a core 38 made to conform to the shape of the sound-conveying-arm 27 and is adapted to fit into the said arm. The core has a spiral groove 39 formed in its surface which forms a channel when the core is tightly inserted in the said arm 27 through which channel the sound must pass in traveling from the sound-box. By increasing the length of travel of the sound the same is

modified and the tone is greatly improved. A similar core may be inserted in the trumpet for a like purpose without departing from my invention.

5 By constructing the talking machine in the manner above described the parts may be readily assembled or taken apart and packed in a small space. The operation of the different parts of the device is greatly
10 simplified and the cost of construction reduced.

Having thus described my invention I claim and desire to secure by Letters Patent:

1. In a talking machine, the combination
15 of a sound-conveying-tube, a second sound-conveying-tube of smaller diameter adapted to fit loosely into the first mentioned tube, a pin on said larger tube, a bearing on said smaller tube, and a sleeve mounted in said
20 bearing adapted to fit over said pin and suspend the end of said smaller tube within the end of said larger tube.

2. In a talking machine, the combination of a sound-conveying-arm, a sound-box, a
25 tube connected with said sound-box, a pin on said sound-conveying-arm, a sleeve adapted to fit over said pin, a bearing secured on said tube, and means for pivotally mounting said sleeve in said bearing.

3. In a talking machine, the combination of a sound-conveying-arm, a sound-box, a
30 tube connected with said sound-box, a pin on said sound-conveying-arm, a sleeve adapted to readily slip over said pin, a bearing secured on said tube, pivot points in said bearing to pivotally connect said sleeve and said
35 bearing.

4. In a talking machine, the combination of a sound-box, a sound-conveying-member,
40 a core inserted in said sound-conveying-member, and said core having a spiral groove formed in its surface to form a passageway for the sound.

5. In a talking machine, the combination
45 of a record-disk-table, a sleeve secured in the

latter, a pivot-post upon which said sleeve is loosely mounted, a shaft adapted to enter said sleeve and rest upon said pivot-post, and means for locking said sleeve and said shaft together.

6. In a talking machine, the combination of a record-disk-table, a sleeve secured in the
50 latter, a pivot-post upon which said sleeve is loosely mounted, a shaft adapted to enter said sleeve and rest upon the end of said
55 pivot-post, a projection on said shaft, and said sleeve having a slot formed therein to receive the projection on said shaft and lock the said shaft and sleeve together.

7. In a talking machine, the combination
60 of a record-disk-table, means for rotating the latter, a pivot-post on which said record-disk is mounted, arms mounted upon said disk-table, and said arms having weights thereon.

8. In a talking machine, the combination
65 of a record-disk-table, a pivot-post on which the latter is mounted, an arm carrying said pivot-post, a stand-rod, means for adjustably securing said arm upon said stand-rod, a
70 sound-box, sound-conveying-members, and means for supporting said sound-box and said sound-conveying-members upon said adjustable bearing.

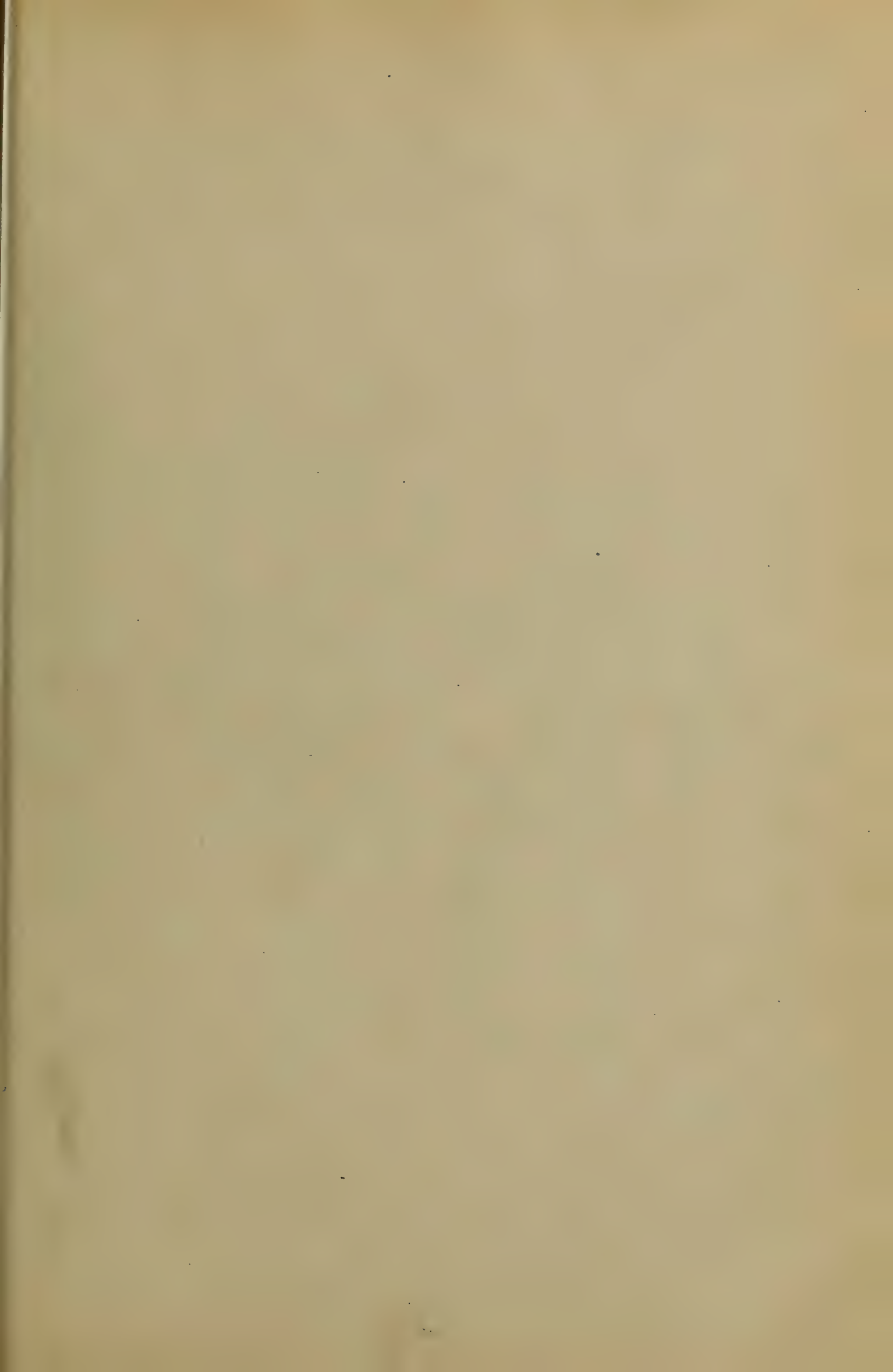
9. In a talking machine, the combination of a record-disk-table, a pivot-post on which
75 the latter is mounted, an arm carrying said pivot-post, a stand-rod, a base, means for adjustably securing said arm upon said stand-rod, said pivot-post having a portion projecting below the said arm, a nut adjustably
80 mounted on the latter a sound-box, sound-conveying-members and means for supporting said sound-box and said sound-conveying-members upon said stand-rod.

In testimony whereof I affix my signature
85 in presence of two witnesses.

DAVID KLINE.

Witnesses:

JOSEPH T. TAYLOR,
M. R. CLEELAND.

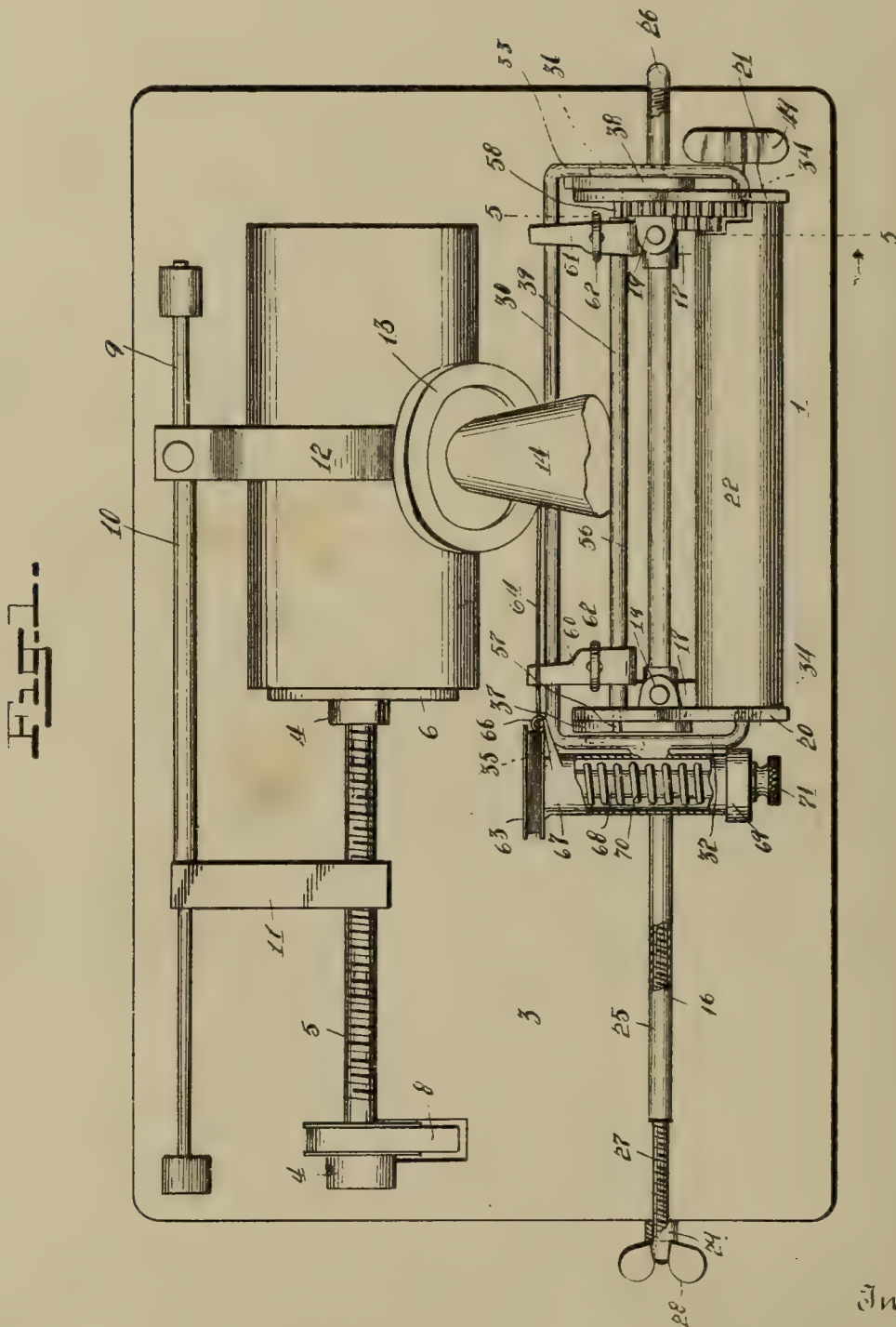


No. 858,184.

PATENTED JUNE 25, 1907.

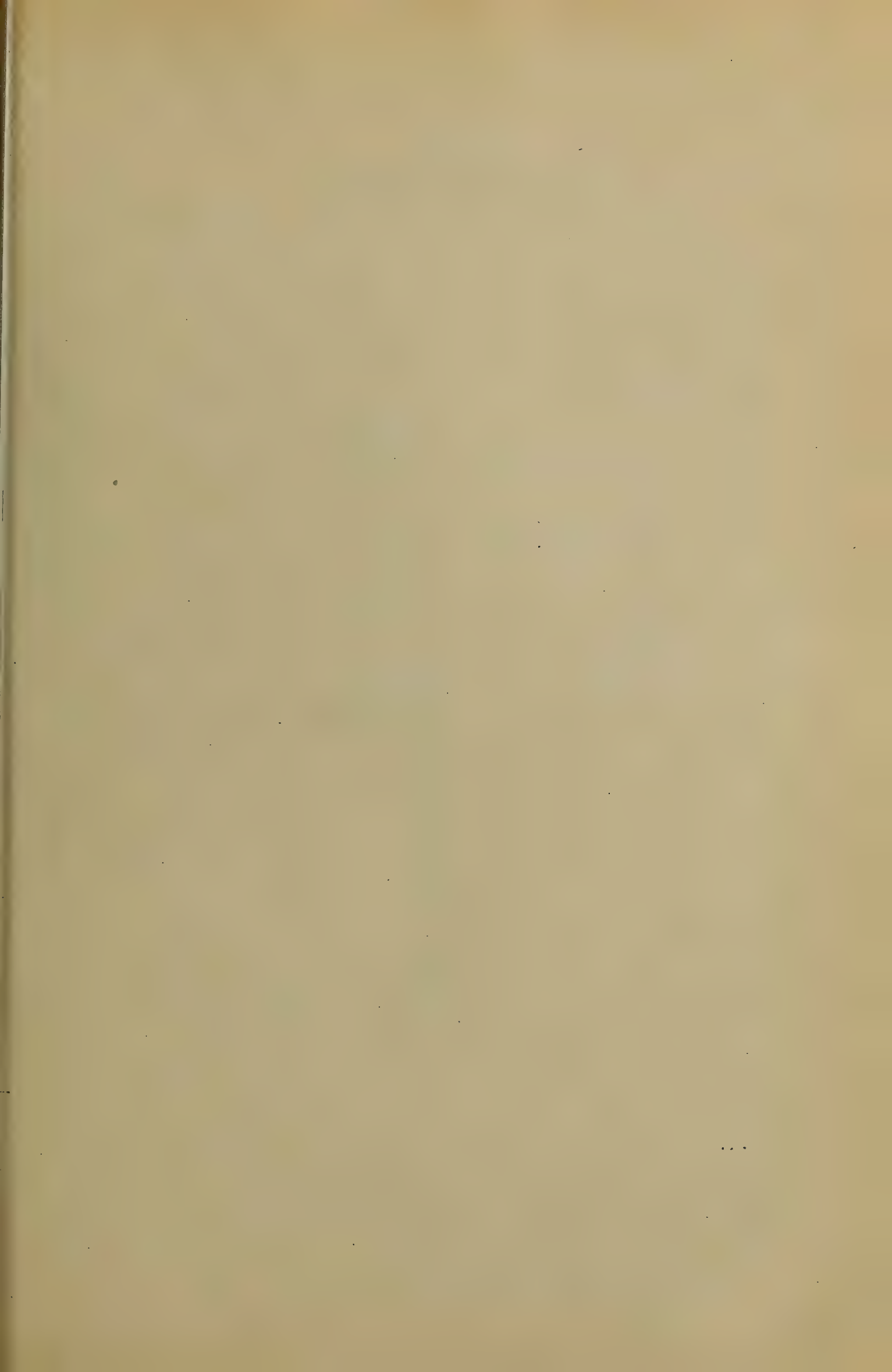
C. L. HOLM.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED SEPT. 20, 1906.

3 SHEETS—SHEET 1.



Witnesses
Edgar A. Murray
C. F. Griesbauer

Inventor
C. L. Holm.
By *A. B. Wilson & Co.*
Attorneys



C. L. HOLM.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED SEPT. 20, 1906.

3 SHEETS—SHEET 2.

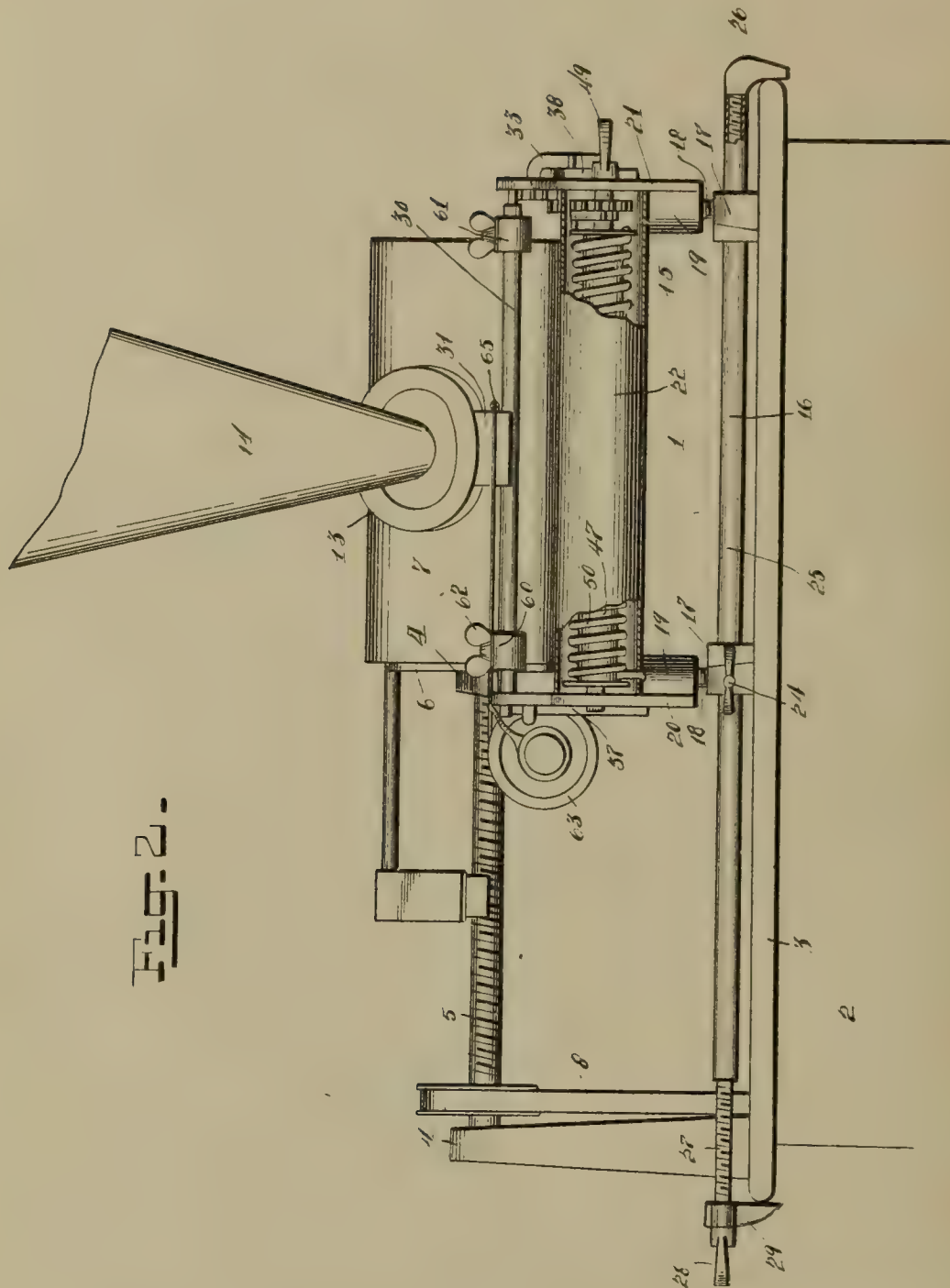


Fig. 2.

Witnesses

Edgar J. Murray
C. H. Giesbauer

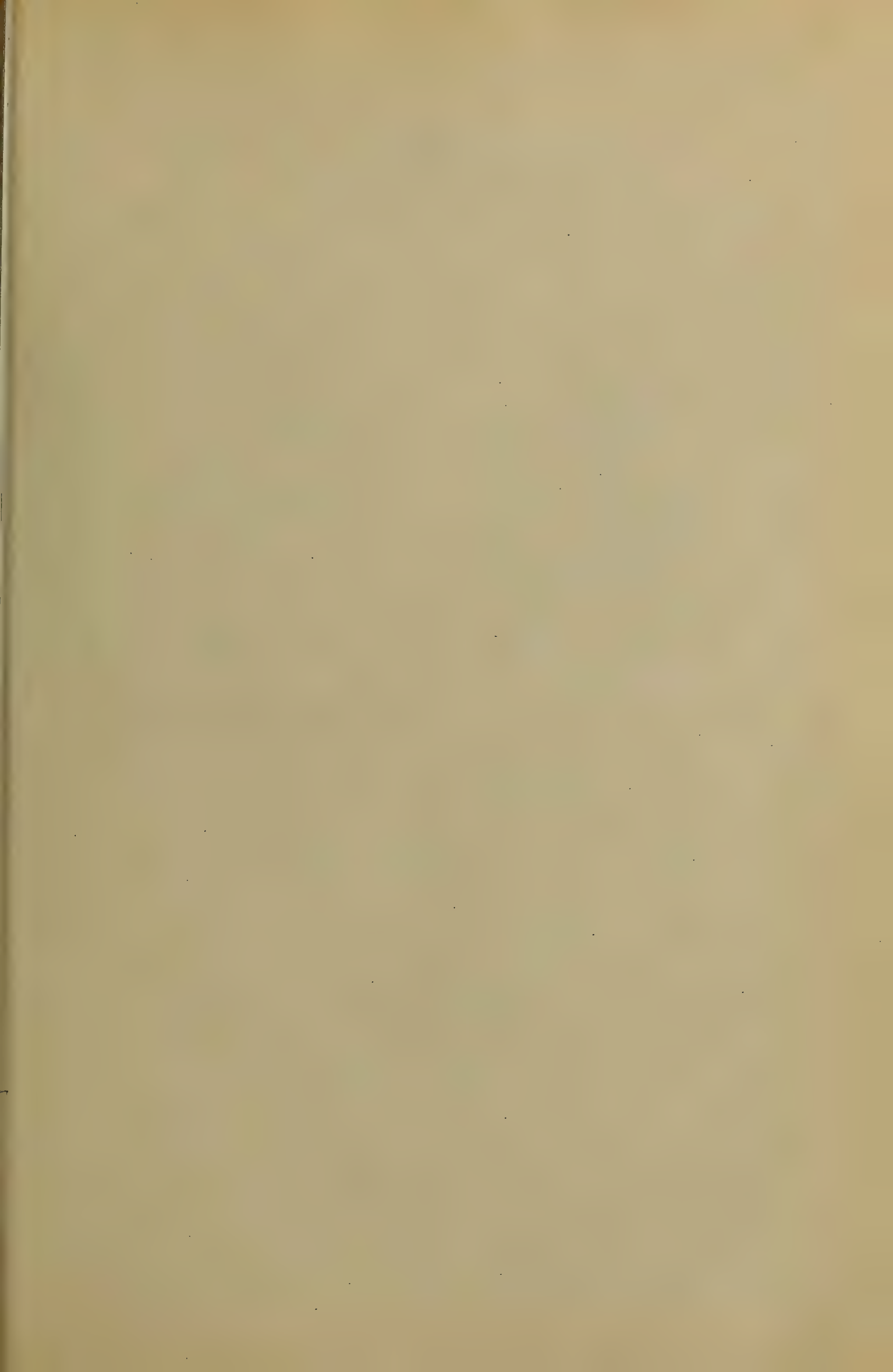
Inventor

C. L. Holm.

by

A. B. Wilson & Co

Attorneys

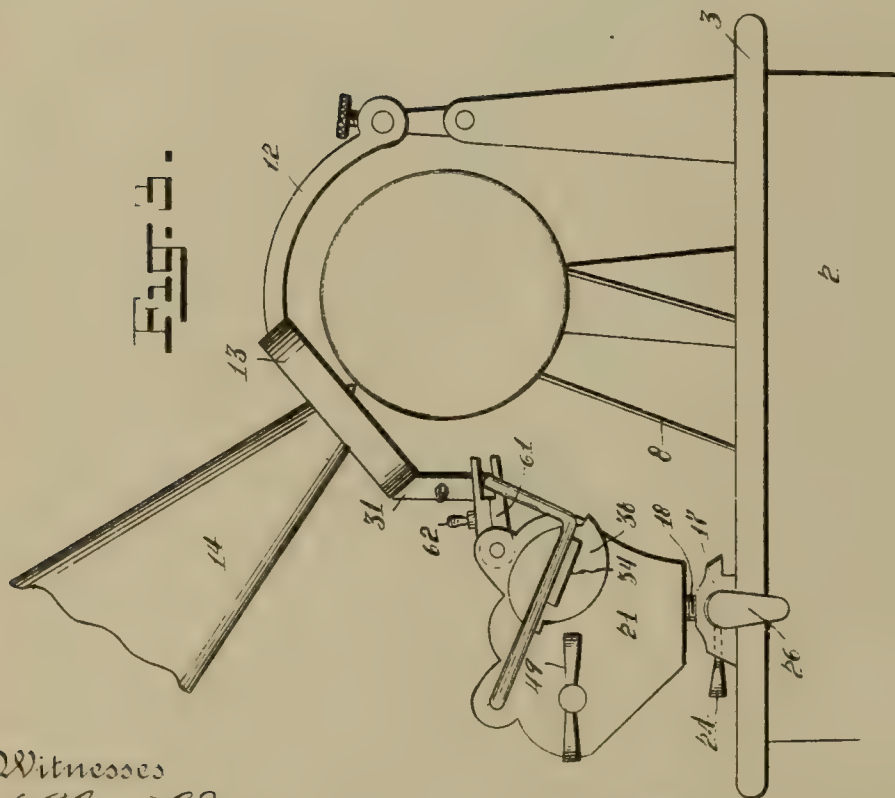
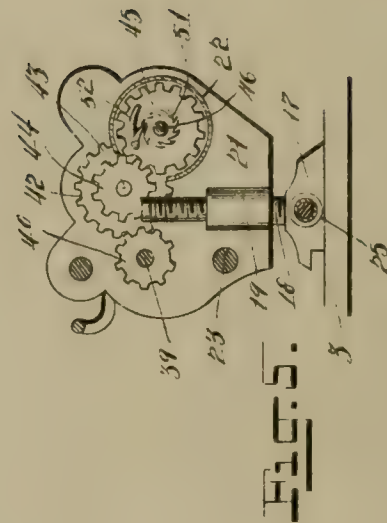
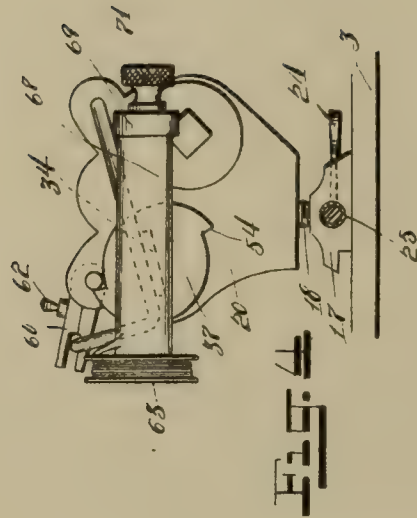


No. 858,184.

PATENTED JUNE 25, 1907.

C. L. HOLM.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED SEPT. 20, 1906.

3 SHEETS—SHEET 3.



Witnesses
Edgar Murray
C. H. Giesbauer

Inventor
C. L. Holm
by *A. B. Wilson & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

CHRISTIAN L. HOLM, OF SPOKANE, WASHINGTON.

PHONOGRAPH ATTACHMENT.

No. 858,184.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed September 20, 1906. Serial No. 335,387.

To all whom it may concern:

Be it known that I, CHRISTIAN L. HOLM, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Phonograph Attachments; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in mechanisms for repeating the records on phonographs.

The object of the invention is to provide a mechanism of this character of simple and compact construction, which may be quickly and easily adjusted for use upon various kinds and sizes of phonographs for repeating a record in full or in part as many times as may be desired.

With the above and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings:—Figure 1 is a top plan view of a phonograph, showing the invention mounted thereon, parts being broken away to more clearly illustrate the construction; Fig. 2 is a front elevation, with parts broken away; Fig. 3 is an end elevation; Fig. 4 is an elevation of the opposite end of the attachment or mechanism; and Fig. 5 is a vertical transverse sectional view, taken on the plane indicated by the line 5—5 in Fig. 1.

Referring to the drawings by numeral, 1 denotes the improved repeating mechanism, which is in the form of an attachment adapted for use upon phonographs of various kinds and sizes. As shown it is mounted upon a well known form of phonograph, consisting of a casing or cabinet 2, in which is mounted a suitable motor and controlling mechanism therefor. Upon the top 3 of the casing 2 are provided suitable bearings 4, in which is mounted for rotation the usual screw 5 provided at one of its ends with a holder 6 for the cylindrical record 7. The feed screw 5 is driven by a belt 8, which extends through a slot in the top 3 and connects wheels upon the motor and feed screw, as will be readily understood. Suitably mounted above the top 3 at its rear is a longitudinally extending guide rod 9, upon which is slidably mounted

a sleeve or tube 10 having at one end an arm 11 provided with a half-nut to engage the feed screw 5 and at its opposite end with an arm 12 carrying a reproducer 13 from which projects a horn or trumpet 14. The sleeve 10 is adapted to both slide and rotate upon the guide rod 9, so that when the reproducer is raised, the half-nut on the arm 11 will be disengaged from the feed screw. The above parts are old and well known.

The repeating mechanism or attachment 1 comprises a suitable supporting frame 15 adapted to rest upon the top 3 of the casing 2 and to be detachably secured thereon by a clamp 16. The frame 15 upon which the operative parts of the mechanism are mounted comprises two base blocks 17, which serve as supporting feet and which have projecting vertically from them screw studs 18. The studs 18 enter threaded sockets 19 provided upon two end plates 20, 21, which are rigidly connected by a cylindrical casing 22 and a rod 23. The parts 21, 22, 23 form a rigid upper frame, which is vertically adjustable owing to the screw studs 18. The base blocks or feet 17 are formed with openings through which the clamp 16 extends and slides, so that the supporting frame 15 may be moved to any point upon the clamp and thus adjusted horizontally. A setscrew 24 provided in one of the feet 17 is adapted to hold the frame and clamp rigidly together in an adjusted position. The clamp 16 comprises a tubular rod 25, which is internally screw threaded and has screwed into one of its ends a clamping jaw 26 adapted to engage one end of the top 3. In the opposite end of the tube 25 is screwed a threaded rod 27 having at its outer end a finger piece 28. A clamping jaw 29 is loosely mounted upon the rod 28 to engage the opposite end of the top 3, as clearly shown in Figs. 1 and 2. The clamp 16 is thus made extensible, so that it may be secured upon phonographs of various sizes.

The mechanism mounted upon the upper portion of the supporting frame 16 is controlled by the reproducer 13, and is adapted to automatically lift the reproducer from the record when the latter has been played in full or in part, as may be desired, then return the reproducer to its starting point and lower it upon the record, so that the latter may be repeated. This mechanism comprises a vertically swinging support 30, which is disposed normally beneath a projection 31 upon

the reproducer just out of contact with the same and is adapted to raise and lower the reproducer and serve as a guide for the same when it is elevated and being returned. This support 30 is in the form of a U-shaped frame or lever having a longitudinally extending portion and two end portions 32, 33, which are pivoted in longitudinal alinement at 34 upon the outer faces of the two side plates 20, 21. The frame 30 is adapted to be elevated and retained in such position by two cams 35, 36 upon which the ends 32, 33 of the frame are adapted to rest. These cams are in the form of straight ribs or projections upon plates 37, 38 disposed upon the outer faces of the plates 20, 21 and secured upon the outer ends of a longitudinally extending rod 39, which is mounted for rotation in said plates 20, 21. The rod or shaft 39 has secured adjacent to one of its ends a pinion 40, which meshes with a gear 41 loosely mounted upon a stub shaft 42 projecting from the inner face of the plate 21. Fixed to the inner face of the gear 41 is a pinion 44, which meshes with a gear 45 loosely mounted upon the shaft 46 of a spring drum 47. This drum 47 is disposed in the cylindrical casing 22 and has one end of its shaft seated in a bearing formed in a screw cap or plug 48, which closes one end of the casing 22. The other end of the drum shaft 46 extends through a bearing opening in the plate 22 and has upon it a winding key 49. Surrounding the drum 47 is a coil spring 50, which has one of its ends secured to said drum and its other end to the casing 22, as shown in Fig. 2. Fixed upon the gear 45 is a ratchet wheel 51 adapted to be engaged by a pawl 52 provided upon the adjacent end of the drum 47 and held in engagement with said ratchet wheel by a spring, as seen in Fig. 5. The cam plates 37, 38 are adapted to serve as escapements for the spring 50 and are formed at diametrically opposite points with stop projections 54, which coact with a trip device 55, which is in turn operated or controlled by the reproducer 13. This trip device comprises a longitudinally extending rod 56 arranged between the plates 20, 21 and having reduced ends 57, 58 which extend through and slide in openings in the plates 20, 21 and are adapted to coact with the stops 54 on the cam plates or escapements. These reduced ends 57, 58 form detents, which are alternately moved into and out of the path of rotation of the stops 54 on the two cam plates 37, 38. The reduction of the ends of the rod 56 form annular shoulders 59, which serve to limit the sliding movement of the trip device and the length of their stop ends 57, 58 is such that when the shoulder 59 at one end of the rod is engaged with its adjacent plate of the frame 15, the stop at the opposite end of the rod will be drawn into the opposite end plate of the frame 15 and will be

out of the path of the projection on the cam plate at such end, as will be readily seen upon reference to Fig. 1. The reproducer 13 shifts the trip rod 55 by engaging adjustably stop arms 60, 61 provided upon said rod. These stop arms are here shown in the form of clamps adjustable on the rod 56 by set screws 62 and having their inner ends bifurcated or slotted to loosely receive the supporting rod 30. By adjusting the stop arms 60, 61 upon the trip rod 56 any portion of the phonograph record may be repeated by the mechanism. In order to return the reproducer to its starting or initial position after it has been elevated from the record and the feed nut has been disengaged from the feed screw, I provide a spring-actuated winding drum or wheel 63 with a belt, cord or other flexible connection 64, which has its free end attached as at 65 upon the projection 31 of the reproducer. The cord 64 is wound upon the grooved periphery of the wheel 63 and passes through a guide-eye 66 upon a cylindrical casing 67 secured upon the end 32 of the reproducer support 30. The wheel or drum 63 is mounted upon one end of a shaft 68, which extends through the casing 67 and a screw cap 69 on one end of said casing. This shaft and its wheel 63 are actuated by a coil spring 70 surrounding the shaft within the casing. This spring may be tightened by holding the wheel or drum 63 against movement and turning a knob 71 upon the outer end of the shaft 68.

In operation, the projection 31 on the reproducer 13 when the latter has moved the desired distance, engages the stop arm 61 and shifts the trip rod 56 longitudinally from its normal position shown in Figs. 1 and 2, in which it will be observed the support 30 is disposed directly beneath and just out of contact with the said projection, the reproducer being in its lowered position. When the rod 56 is thus shifted, its end 57 is moved into the path of one of the stops upon the cam plate 38 while its opposite end 57 is retracted from one of said stops on the cam plate 37, the latter being thus released will be given a partial rotation owing to the train of gearing which connects its shaft 39 to the spring-actuated drum 47. The rotary movement of the cam plate 37 is limited by the engagement of one of the stops 54 on the other cam plate 38 with the end 58 of the trip rod. The partial rotation of the plates 37, 38 causes their cams 35, 36 to elevate the reproducer support 30 and hence the reproducer itself. The elevation of the reproducer causes the nut upon the arm 11 to be disengaged from the feed screw 5 and when this occurs, the spring 70 will rotate the drum or wheel 63 to wind the cord 64 thereon and shift the reproducer to its initial or starting position. When it reaches this position, its projection 31 engages and moves the stop arm 62, so that the

trip rod 56 is again shifted longitudinally but in the opposite direction. This movement of the rod causes its end 57 to project into the path of one of the projections 54 on the cam plate 37 and retracts its opposite end 58 from one of said projections upon the other cam plate 38. The latter is thereby released, so that the plates will be again partially rotated. This partial rotation will permit the cams to move to their normal positions shown in Figs. 3 and 4 and thereby lower the reproducer support 30. When this occurs the reproducer itself is lowered upon the record and the nut on the arm 11 again engaged with the feed-screw. This operation may be repeated as many times as desired.

It will be observed that the device or attachment is of very simple and compact construction and that its many adjustments permit it to be used upon phonographs of various kinds and sizes. By removing the clamp 16 from the feet 17, the latter may be turned to adjust their screw studs in the socket 19 and thereby permit of the vertical adjustment of the supporting frame 15 with respect to the phonograph. This frame may be adjusted horizontally with respect to the phonograph by shifting it upon the clamp and the latter is extensible so that it may be applied to a phonograph having a casing or cabinet of any size. By holding the wheel or drum 63 in turning the knob 71, the tension of the spring 70 may be varied, so that the reproducer will be returned as quickly or as slowly as may be desired. By adjusting the stop arms 60, 61 upon the trip rod 56 the reproducer may be caused to repeat any desired portions of the record.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent, is:—

1. In a mechanism for repeating phonograph records, the combination of a reproducer, a vertically-movable support to raise and lower the reproducer and serve as a guide for the same when elevated, a motor, a pair of revoluble devices operated thereby and each having a lifter and projections, said lifters coacting with said support to raise and lower the latter, and a longitudinally-movable trip device operated directly by the reproducer to alternately engage projections of the respective revoluble devices and control the revolution thereof.

2. In a mechanism for repeating phonograph records, a supporting frame, a spring actuated shaft therein, a second shaft in said

frame geared to said spring-actuated shaft, plates upon the ends of said second shaft having projections and cams, a substantially U-shaped swinging frame pivoted upon the first-mentioned frame and having end portions to engage said cams, and a connecting portion to raise and lower a reproducer and serve as a guide for the latter when elevated, a shiftable trip rod slidably mounted in said frame and having detents at its ends to be moved into and out of the paths of the projections on said plates, adjustable stop arms upon said trip rod adapted to be engaged by the reproducer, and means for returning the reproducer when elevated by said support.

3. In a mechanism for repeating phonograph records, a supporting frame, a spring-actuated shaft therein, a second shaft in said frame geared to said spring-actuated shaft, plates upon the ends of said second shaft having projections and cams, a substantially U-shaped swinging frame pivoted upon the first-mentioned frame and having end portions to engage said cams, and a connecting portion to raise and lower a reproducer and serve as a guide for the latter when elevated, a shiftable trip rod slidably mounted in said frame and having detents at its ends to be moved into and out of the paths of the projections on said plates, adjustable stop arms upon said trip rod adapted to be engaged by the reproducer, and spring-actuated means upon said support for returning the reproducer when the latter is elevated by said support.

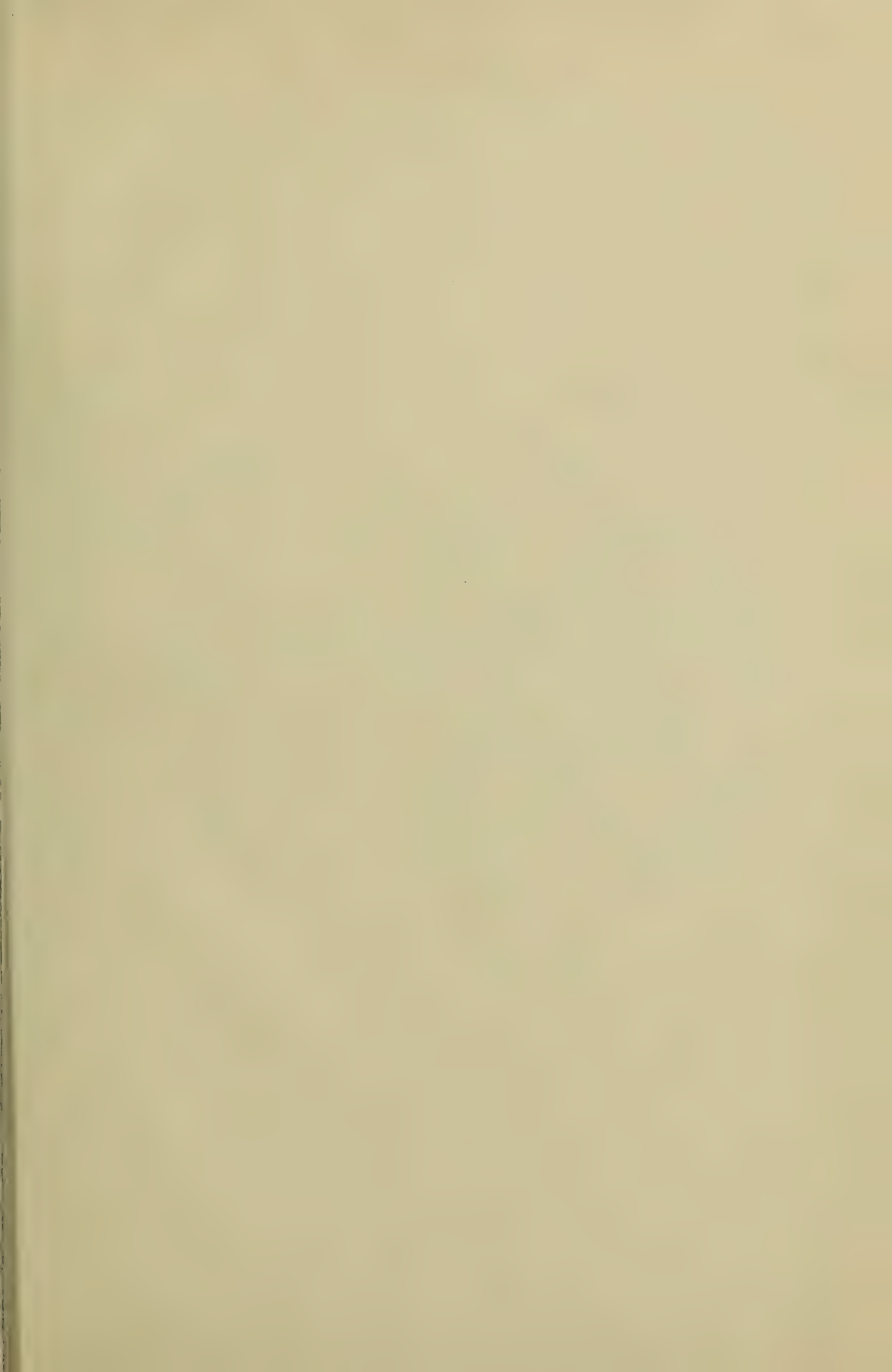
4. In a mechanism for repeating phonograph records, a supporting frame, a spring-actuated shaft therein, a second shaft in said frame geared to said spring-actuated shaft, plates upon the ends of said second shaft having projections and cams, a substantially U-shaped swinging frame pivoted upon the first-mentioned frame and having end portions to engage said cams, and a connecting portion to raise and lower a reproducer and serve as a guide for the latter when elevated, a shiftable trip rod slidably mounted in said frame and having detents at its ends to be moved into and out of the paths of the projections on said plates, adjustable stop arms upon said trip rod adapted to be engaged by the reproducer, means for returning the reproducer when elevated by said shaft, and means for adjustably mounting said frame upon a phonograph.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHRISTIAN L. HOLM.

Witnesses:

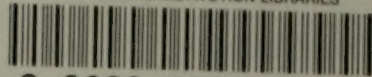
W. F. HAHNERT,
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